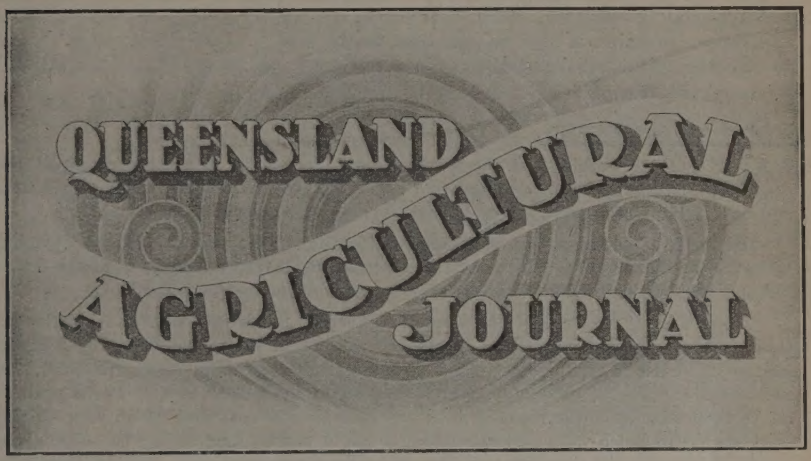
ANNUAL RATES OF SUBSCRIPTION.

Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling.** Members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten Shillings,** including postage.



VOL. XXXVIII. 1 SEPTEMBER, 1932. PART 3.

Event and Comment.

Back to the Land.

"THE time is opportune for a back-to-the-land movement," declared the Premier, Mr. W. Forgan Smith, in the course of a recent Press interview. He advised parents to direct the minds of their children to life on the land, and pointed out that even in normal times there were not sufficient jobs to meet the demands of those who drifted to the cities. The Premier said he agreed entirely with the view, publicly expressed, that parents should turn to rural pursuits instead of to clerical occupations for their children. Queensland was essentially a primary-producing country, and parents should try, as far as possible, to direct the attention of their boys towards life on the land. With the development of secondary education in recent years the tendency had been to look for clerical and other professional openings, but even under normal conditions there were insufficient jobs to go round. The attitude of the public mind was such that the time was opportune for a back-to-the-land movement.

Rural Training.

THE Minister for Agriculture and Stock (Mr. F. W. Bulcock) is also giving consideration to the problem. The matter had been engaging his attention for some time, he said to the Press recently, and he hoped to be able to place before the Cabinet in the near future a scheme which would aim definitely at giving boys a rural training before they embarked on country life. His department was investigating several possibilities for providing rural training for boys. It had been suggested that an organisation might be set up, using the existing services, to register boys who wished to embark on farm work. At the same time, it was suggested another branch of the same organisation might work in the bush, or public officers might be used for finding employment for boys in the country. Another

proposal was the establishment of an agricultural training centre near Brisbane, where suitable boys could be given general experience after a course of studies at the Central Technical College. The latter proposal found most favour in his eyes, and was being investigated. "The Government is definitely pledged to the formulation of a scheme to train our boys and get them on the land," added the Minister. "Side by side with this arises the question of land settlement and economic land utilisation."

Science and the Farmer.

"MOST of the problems of the farmer to-day are solved in the laboratory," said the Minister for Agriculture and Stock, Mr. F. W. Bulcock, in his presidential address at the annual conference of the Council of Agriculture last month.

Farmers, he added, should pay greater attention to the scientific side of farming, while he, as Minister, as far as the finances of the State allowed it, would do all that he could to foster scientific research in agriculture in Queensland.

After urging members of the council to keep in touch with him and his Department, more particularly as far as marketing conditions were concerned, the Minister said he intended to go into the vexed question of dual grading standards for butter and other exportable products. Mr. Bulcock said he looked at the world position in the light that, with the rapid growth of population in countries which were thickly populated, but which were still exporting, it would not be long before those countries would only be producing enough for their own consumption. It was then that Australia would have a better market for its goods, and he considered that they must be prepared to take advantage of that market. From his knowledge Queensland products compared favourably with those from other parts of the world.

He believed that the prosperity of the State depended upon the primary producer. They must pursue a policy by which some means of understanding the farmers' problems would be available to the man in the city, and the problems of the city to the man on the land. At one time there was a mutual antagonism between the dwellers of the city and the men in the country, but this was passing. The Minister said he believed that the farmer should control his own destiny, and that policy had been adopted by the primary producer in this State. To-day there was organised marketing for most products of Queensland. He did not regard the organisation as being perfect, but considered that which had been evolved during the last ten years had been very satisfactory. The next ten years ahead would most likely bring very necessary legislative enactments for the benefit of the State, provision being made for the interests of the community, and not merely for the individual.

The Beef Industry—Its Importance to Queensland.

"ONE cannot help but be impressed with the fact that the production of cattle has an important bearing on almost every industry in the State. Practically no enterprise of any kind exists that is not dependent in some shape or form on the meat industry." In these words the State Premier, Mr. W. Forgan Smith, emphasised the importance of the meat industry to Queensland, prior to declaring the Live Stock and Meat Industry Hall at the Brisbane Show open to the public. "Since 1927, the meat industry, in common with others, has undergone many vicissitudes," said the Premier. Queensland exported approximately 40 per cent. of the meat produced, and it was pleasing to know that the industry had also entered the market in regard to pork, mutton, and lamb. The figures displayed in one of the exhibits were illuminating, inasmuch as they indicated the possibility of a greater expansion of inter-Empire trade. At Ottawa the meat industry was looking for some support in the marketing of its products, whether in the form of a preferential tariff or a quota for the various constituent parts of the Empire. The Commonwealth of Australia, in common with the civilised world, was encountering problems of a magnitude hitherto unexampled, and the future of their civilisation would, to a very large extent, depend on the manner in which those

problems were approached. To-day they had the problems of unexampled productivity, and the fact that a growing proportion of people were unable to earn a reasonable or proper livelihood. These problems could only be effectively dealt with if they were regarded from a national standpoint. "In Queensland," said the Premier, "we have every variety of soil, and of climatic conditions, all the known minerals, an abundance of timber, and all the essentials to maintain a large population in a high degree of civilisation. Consequently, it is our duty to-day to be true to the pioneers of Australia, and see to it that in our generation, we are able to pioneer where necessary in a manner that will benefit future generations."

Referring to some of the problems of the industry, Mr. Smith said that on the marketing side, developments of a far-reaching character appeared to be imminent. At present, Australia suffered in the overseas market very largely because of the fact that their meat arrived in a frozen condition, and competed with the products of other countries that could land their product chilled—which was an obvious advantage. He understood, however, that research was proceeding, apparently satisfactorily, in the direction of devising ways and means whereby their meat could be sold in similar fashion, and be de-frosted without the destruction of tissue that took place at the present time. "If those experiments are successful, they will mean a great deal to the cattle industry of Queensland," declared the Premier. In conclusion, Mr. Forgan Smith paid a warm tribute to the social service of men who made such displays possible, singling out for special mention the organising genius and painstaking persistency of Mr. E. F. Sunners, and ended by declaring the display officially opened.

The Buffalo Fly Menace.

COMMENTING on an opinion expressed recently that the buffalo fly will not come further south than Rockhampton, the Minister for Agriculture and Stock, Mr. F. W. Bulcock, said that the menace had been so well recognised in Java that the Dutch authorities had seen fit to employ highly-trained entomologists and parasitologists in an attempt to secure biological control. It was hoped that the results of that work would be of value in Queensland. It was difficult, continued Mr. Bulcock, to foretell the extent to which the fly would thrive in varied climatic conditions. It remained for some time in a certain area, and then began to migrate eastwards. This, he thought, was evidence that the fly was becoming acclimatised, and could live in zones where it could not exist previously. Therefore, it was necessary to regard any conclusion otherwise as problematical.

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director, Bureau of Sugar Experiment Stations.

PART XXIX.

GLEANINGS FROM THE "SUGAR JOURNAL," PUBLISHED AT MACKAY FROM 1892 TO 1900.

Early Italian Immigration.

ON the 29th January, 1892, the Herbert River correspondent wrote:—"As you know we have Italians on the river; they are divided between Ripple Creek, Macknade, and Hamleigh. Their first pay was this month, and after it was over seven went to Mr. Boyd (of Ripple Creek) and got him to cancel their agreements, and three did the same with Mr. Neame. It seems there are two classes of Italians—the Piedmontese and the Venetians. The former are men with trades, such as carpet-makers, roadmakers, &c. The latter are agriculturists pure and simple. The Venetians seem to be taking to the work, and are likely to answer the purpose for which they were got—i.e., to take up land on their own account and grow cane for the mills. They are making every inquiry concerning canegrowing, and are only waiting with anxiety for the time to come when they may be growing cane for themselves. It is unfortunate that all the Italians are not of the agricultural class, as it would go a long way towards settling the labour question as far as this little bit of country is concerned."

The "Brisbane Courier" stated the same year—"We learn from a reliable source that some of the Italians who were brought to Queensland by Signor Fraire, and who are now settled on sugar plantations in the North, have received letters from friends in Italy expressing a desire to come to Queensland. They state they will willingly pay their passages provided they are guaranteed employment."

Electric Light in Sugar Mills.

Advocating the use of electric lighting in sugar-mills, an advertisement by Messrs. Barton and White in 1892 sets out the many advantages over kerosene. Messrs. Robb and Company, Young's of Fairymead, and Bingera, appear to have been amongst the earliest sugar-mills in Australia to adopt this method of lighting. The Bingera installation consisted of sixty lights of 16 candle power and six of 250 candle power. It was stated to have a very brilliant effect on the mill at night. Messrs. Trackson Bros., which firm is still in operation in Brisbane, erected the plant.

Splitting Up of C.S.R. Company's Estates.

May, 1892.—The Victoria Estate on the Herbert River is being cut up and let to farmers. There seems every probability that in the near future all cane crushed by the mills on this river will be grown by small farmers and that the millowners will stop cultivating for themselves. *Note.*—This was ultimately realised.

Improvement at Mackay Mills.

10*th June*, 1892.—Homebush appears to be doing the most extensive alterations. They are putting in a shredder to tear the cane before it

reaches the first rollers—a brush to automatically sweep the juice strainer at the rollers, and an elevator to carry the megass, &c., back to the front rollers; still further alterations in the intermediate carrier to make it travel more slowly and thus improve the maceration, and more subsiders. The boilers have been reset. A coil has been passed through the flues, and water going through it into the boilers is heated without extra cost, and is at boiling point when it gets into the boilers.

At the Eton Central Mill maceration of the most approved pattern is being put in, similar to that in use at Habana and Homebush. The juice strainer is being enlarged and made of fine centrifugal gauze.

At Racecourse, tanks, pipes, boilers, &c., are being lagged; the manager is using a composition of flour and sawdust which stands heat well and does not crack and fall away.

Rum Quotations, 1892 (in Bond).

Bundaberg Distillery—30 overproof, 2s. 3d. per gallon.

Pleystowe Distillery—30 overproof, 2s. 6d. per gallon.

The Home market was bad and the demand falling off, further shipments from Queensland were not likely for some time.

ESTIMATE OF 1892 CROP.	Sugar. Tons.
Cairns	2,000
Johnstone	5,500
Herbert	6,325
Burdekin	2,500
Mackay	15,000
Rockhampton	300
Bundaberg	20,000
Maryborough	4,500
Brisbane	1,000
	57,125

This was divided as follows:—1,800 tons yellow sugars; 11,500 tons refined whites; 23,840 tons ordinary whites; 17,285 tons refining sorts; 2,700 tons rations. The supply of Australasia was calculated to be 112,000 tons made up as follows:—

	Sugar. Tons.
Queensland	57,000
New South Wales	35,000
Fiji	20,000
	112,000

Of the whole crop 70,000 tons will be made for or purchased by the Colonial Sugar Refining Company. The consumption of Australasia, including New Zealand, was given at 160,000 tons.

Proposed Central Mills at Bundaberg.

Under date of 8th May, 1892, the Bundaberg correspondent writes—"I see that Mr. Fred Buss is advocating a scheme for the formation of Central Mills in this district. He proposes to raise a capital of £100,000 to erect four mills, at a cost of £25,000 each. Mr. Buss seems to have lost sight of a very important item, viz., the supply of cane

for such mills; they would require an annual supply of 40,000 tons in all. The small farming class who would require to be the backbone of a scheme like this are not men of capital as a rule, so that any company or syndicate would require to set aside enough of their capital to assist the farmer by monetary advances to enable him to clear and plant the necessary area of cane for the mill in the shortest time possible, so that the mills would have a full supply of cane from the start."

Shoal Bay Plantation, Northern Territory.

It is not generally known that there was once a sugar-mill and plantation at Shoal Bay, Northern Territory. The Northern Territory "Times" in July, 1892, remarked—"Cane crushing at Shoal Bay plantation is proceeding successfully, with a cheering prospect of success to the lessee, Mr. Moore. From the commencement of the present crushing up to date, the rollers have put through about 164 tons, and the yield of sugar from this amounts to a trifle over 8 tons. It was the rule to estimate 1 ton of sugar for every 20 tons of cane. The quality was sufficiently good to command a ready sale. The only labour used on the plantation was the free and independent black native of the sod."

Brisbane Refinery.

November, 1892.—"The news that the Colonial Sugar Refining Company, of Sydney, has decided to erect a refinery in Brisbane will be received with general satisfaction in this Colony. The step indicates the confidence which this company has in the future of the Queensland industry. The new refinery will occupy in all 3 acres of land fronting the Brisbane River. The work has been commenced, and its completion is expected in time for the 1893 season. It is improbable that the capacity of the plant will be less than 20,000 tons annually, and all of this will be supplied in its raw state from either the company's or private mills in Queensland."

Note.—The Refinery was opened in August, 1893.

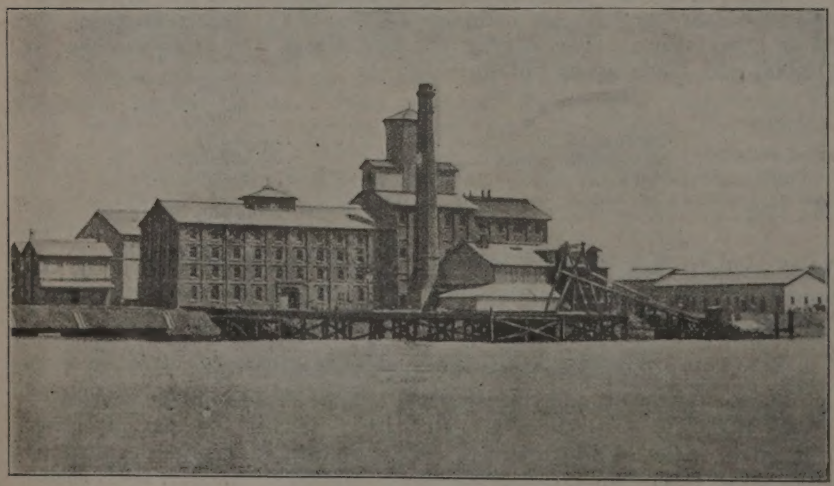


PLATE 83.—NEW FARM REFINERY.

First Mill in Mackay.

Quoting from a copy of the Mackay "Mercury" published in September, 1868, the "Mackay Sugar Journal" says—"The sugar-mill is now in full work and answering every expectation of the proprietors, Messrs. J. E. Davidson and Company. The crushers of the mill consist of three massive rollers, each 2 ft. by 4 ft. . . . On the Alexandra there are two large storehouses being filled with megass to serve as a start for firing for next year's crushing. The entire machinery was made by Fletcher and Company, of London, excepting the Gadsden's pans, vats, and chimney. The number of hands employed on the plantation is 79, viz.:—25 white men and 54 South Sea Islanders—all of whom are fully employed either cutting, carrying, feeding, skimming, spreading megass, or other work. . . . The sugar made is of first-rate quality, good colour, and rich tasting. About 200 acres are ready for crushing."

Habana Mill (Mackay) Returns, 1892.

It will undoubtedly be of much interest to extract the mill returns of Habana for 1892 for comparison with present day work. The "Mackay Sugar Journal," in publishing these, says—"The Habana figures, while not showing perfect work, are interesting and valuable, the more so because this estate is the first one in Queensland to publish results based on scientific investigation. Habana has averaged a mill extraction per cent. of weight of sugar of 91·74, and this without any shredder or comminutor":—

Cane crushed—	
Weight in tons	23,451·05
Average per cent. cane sugar	15·44
Average per cent. fruit sugar	·36
Average per cent. other organic matter	1·43
Cane sugar in tons	3,620·90
Fruit sugar in tons	84·78
Other organic matter	335·63
First sugars—	
Total sugar in tons	1,956·25
Average analysis—	
Cane sugar	97·63
Fruit sugar	·56
Other organic matter	·35
Ash	·44
Average net titre	94·80
Second sugars—	
Total sugar in tons	369·35
Total molasses in tons	43·0
Average analysis—	
Cane sugar	91·40
Fruit sugar	1·56
Other organic matter	1·88
Ash	1·49
Average net titre	82·01
Third sugars—	
Total sugar in tons	215·80
Total sugar molasses	122·52
Average analysis—	
Cane sugar	82·29
Fruit sugar	2·05
Other organic matter	3·51
Ash	2·15
Average net titre	75·86

All sugars—	
Total sugars obtained in tons	2,725·08
Average analysis—	
Cane sugar	95·93
Fruit sugar	·84
Other organic matter	·85
Ash	·74
Average net titre	91·34
Megass—	
Average sugar	5·54
Average sugar per cent. weight of cane	1·33
Average sugar per cent. weight of sugar	8·62
Average water	45·74
Average fibre	23·31
Losses—	
In megass per cent. weight of sucrose	8·62
Loss of sucrose in megass in tons	311·89
Loss of sucrose in mill per cent. of sucrose	16·12
Loss of sucrose in mill in tons	583·93
Total loss from cane to products in tons	895·82
Extraction at rollers per cent. weight of sugar	91·74
Average cane sugar in press cake	6·34
Tons of cane to ton of sugar	8·27

Small Farms on Sugar Plantations.

October, 1893.—"To ascertain as far as possible how far the movement for the cultivation of cane by small farmers is progressing, or, in other words, how far the Central Mill question is taking root in Queensland, inquiry was made at Mackay, Bundaberg, and the Johnstone and Herbert Rivers, with the results shown hereunder, from which it is evident that the movement is increasing:—

	Acres.
Mackay—143 farmers (of whom 22 are shareholders in the Central Mills) are growing cane upon	4,264
Bundaberg—148 farmers upon	4,351
Herbert River—68 farmers upon	3,923
Johnstone River	Nil

Care has been taken in obtaining the above information to exclude all those who would come under what is generally known as 'planters.' All the above farmers (excluding the shareholders in the Central Mills at Mackay) grow cane for sale at a mill in which they have no direct interest otherwise than as a market."

Childers Mill.

In 1893 the Hon. E. Knox announced—"We are under engagement to erect another mill in Queensland, in the Isis Scrub near Bundaberg. Some months ago we received satisfactory offers from the farmers there to grow cane for us, and we have undertaken to put up a mill in time for season 1896. We have every reason to expect satisfactory returns from this venture, our sales of refined sugar continue to increase with the growth of population, and this factory will only serve to maintain the proportion of sugar that we have been in the habit of producing at our mills for the work of the refineries."

Carmilla.

Carmilla is now a well-established sugar district, but it has only been so during recent years. As far back as 1894, however, the residents were anxious to commence sugar-growing. In a publication quoted in

the "Mackay Sugar Journal" for that year it was stated—"Carmilla offers unrivalled opportunities to bona fide agriculturists and men of small capital to select virgin soil sugar lands. But suitable as the lands are for canegrowing, it is impossible for their owners to individually cultivate a sufficient area to keep a large mill employed capable of turning out, say, 4,000 tons of sugar during the season. Such a mill must have from 30,000 to 40,000 tons of cane annually. It has come to be recognised that in order to ensure success large mills are essential. Small mills can only result in disappointment and loss, and everywhere factories are becoming larger and larger. Planting is carried on more economically on a small scale, while the manufacture of sugar is made relatively cheaper when it is carried out upon a large scale, the two operations thus combined contributing to a permanent and profitable enterprise."

Herbert River Flood, 1894.

Disastrous floods in the Herbert River are not unusual. In April, 1894 it was reported that the highest flood ever known in the river rose on a Saturday night and kept up till the following midday. Eight lives were lost for certain and others were thought to be drowned. The water was into Victoria and Ripple Creek Mills, but no serious damage was done. *Note.*—Unfortunately, this was not the last loss of life in Herbert River floods.

The Sugar Crisis, 1894.

The problem of the over-production of sugar was a worry to the sugar industry in 1894 just as it is to-day. Restriction of output was then being advocated as it is to-day, but it was recognised that this would not do much good unless the restrictions were general. Another proposal made was to feed cattle on sugar, but it was pointed out that this relief would only be temporary, because as soon as the sugar went into consumption prices would rise and cattle would have to revert to their former feed.

SIZES OF SUGAR FARMS AND PLANTATIONS, 1895.

Size.	Numbers.	Total Area.
2 to 5 acres	191	783
5 to 15 acres	434	4,378
15 to 30 acres	324	7,482
30 to 45 acres	170	6,463
45 to 60 acres	90	4,823
60 to 75 acres	37	2,530
75 to 90 acres	30	2,506
90 to 105 acres	15	1,488
105 acres and over	95	38,378
Totals	1,386	69,031

This gives an average of 49 acres per grower. The present day average is 41, showing that the smaller farmer has increased.

Marian and Pleystowe Mills, Mackay.

August, 1895.—"The Marian Mill has been duly opened with a grand invitation ball, cracking of champagne, and congratulatory speeches. It is now working on a crop of 22,000 tons of cane.

"The Pleystowe Central Mill is to commence almost immediately. It will only have a small crop of 9,000 to 10,000 tons of cane".

YIELDS OF SUGAR PER ACRE, 1893 AND 1894.

Place.	Tons. 1893.	Tons. 1894.
Logan	1·23	1·25
Bundaberg	1·71	1·50
Maryborough	2·18	2·09
Mackay	1·79	1·79
Ayr	1·84	2·57
Ingham	2·26	2·72
Mourilyan	1·36	1·49
Cairns	1·25	1·75
Averages	1·70	1·89

Export of Sugar to Canada.

Seven hundred tons of raw sugar were exported to Canada in 1895 from Queensland, and it was thought at that time quite feasible to push the consumption of Queensland sugar in Canada. In the 1898 Journal it was remarked that Canada had decided to extend preferential provision to Queensland.

A Retrospect, 1896.

The epoch of small mills and large areas of semi-cultivated lands is passing away. The small mills are now very few and far between; the large areas of semi-cultivated lands are rarely found in the Queensland sugar districts to-day. Instead of these we can now boast of some of the largest and most complete factories in the world; in our sugar districts are grouped round these mills the homesteads of settlers who have taken up cane culture. The change is a striking one. While there has been an increase of 33,000 acres in the area cultivated with cane since 1892, and while the output of sugar may be said to have practically doubled itself, the whole change has been for the benefit of Queensland and of Australia. It is so customary to associate the Queensland sugar industry with the presence of a large coloured population in our midst that it is worth noting that the number of Polynesians employed in the whole colony has fallen from 9,362 on the 1st January, 1891, to 7,853 on 1st January, 1895. White men working for themselves and using the best labour-saving implements are displacing the coloured workers rapidly. The large estates are rapidly becoming peopled with small farmers.

RESULTS OBTAINED AND COST OF MANUFACTURE OF FOUR CENTRAL MILL COMPANIES, MACKAY, 1895.

——	Pleystowe.	Racecourse.	Marian.	North Eton.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Cost of cane per ton	0 14 0	0 14 8	0 13 7	0 14 0
Cane per ton of 88 n.t. tons	7·6	7·45	7·8	7·95
Cost of cane per ton of sugar £	5 10 9	5 8 6	5 10 3	5 18 3
Cost of manufacture per ton of sugar £	1 13 0	1 12 5	1 16 10	1 15 7
Cost f.o.b. Mackay £	7 12 8	7 15 9	7 19 9	8 11 7
Sugar made tons	715	2,251	2,099	2,078
Price received f.o.b., Mackay £	9 7 6	9 9 9	9 7 10	9 11 11
Net profit per ton £	1 14 10	1 14 0	1 8 1	1 0 4

Queensland in the Sugar World, 1896.

The "Journal des Fabricants de Sucre" quoted from the "Mackay Sugar Journal" that sugar would be placed f.o.b. Mackay, for £7 per 100 kilos, and added "Australian sugar is not yet on the world's market. That is well, but at the rate Queensland is developing her industry we shall not have to wait long for this new competitor. On that day the countries which still adhere to their old cost of about £14 will have seen their days as exporters!"

Hambledon Plantation, Cairns.

The Hambledon Mill and plantation was purchased in 1897 by the Colonial Sugar Refining Company from Messrs. Swallow Bros., the previous owners. It was stated in the "Mackay Sugar Journal" for June, 1895, that "the company desired to lease all the land and did not wish to cultivate an acre for themselves, and that hundreds of farmers were bound to flock to the Cairns district from the Clarence, Tweed, Bundaberg, Maryborough, and Mackay sugar districts, where increasingly impoverished lands and heavy frosts were bringing them to the verge of despair. On the Clarence and Richmond Rivers the sugar-growing industry is practically extinct, and the company were about to shift their mills from these rivers, for the farmers could not grow cane for them." This correspondent was a very poor prophet, as thirty-five years after his prediction the Richmond and Clarence Rivers are still growing cane, and the Colonial Sugar Refining Company has not yet shifted its New South Wales Mills to North Queensland.

PRICE PAID FOR CANE IN NEW SOUTH WALES IN 1898, BY THE COLONIAL SUGAR REFINING COMPANY.

% Obtainable Cane Sugar.	Price per Ton Cane.	% Obtainable Cane Sugar.	Price per Ton Cane.
	s. d.		*s. d.*
17·0	15 7	11·0	10 0
16·0	14 9	10·0	7 6
15·0	13 11	9·0	5 0
14·0	13 1	8·0	2 6
13·0	12 3	7·0	Nil
12·0	11 5		

Proserpine Central Mill.

The above mill commenced operations in 1898 and manufactured 1,350 tons of sugar from 545 acres, equal to a yield of about 2½ tons per acre. The writer of this paragraph says in the "Mackay Sugar Journal" for January, 1899, that the Proserpine district is nearly surrounded by mountains which give an exceptional rainfall, and prophesies that in a few years the mill would be kept working to its full capacity.

Comparison made in 1898 of cane yields per acre and tons of cane required to manufacture one ton of sugar. These were compiled by the Director of the Sugar Experiment Station, West Java.

Country.	Tons of Cane per Acre.	Tons of Cane to Make One Ton of Sugar.
Queensland	16	10·0
New South Wales	16	9·3
Straits Settlements	24	13·3
Java	36	10·0
Japan	15·2	14·3
Reunion	24·0	11·1
Hawaii	33·4	10·0
Spain	20·0	14·3
Louisiana	20·5	13·3
Egypt	22·0	10·0

Quantity of Sugar Produced from June, 1897, to June, 1898.

The following table is taken from the "Mackay Sugar Journal" for January, 1899:—

District.	Tons of Sugar.	Number of Mills.
Ipswich	300	3
Logan	1,537	11
Brisbane	921	2
Maryborough and Childers	14,336	8
Bundaberg	16,998	31
Rockhampton	805	1
Mackay	22,438	12
Proserpine	1,350	1
Lower Burdekin	6,213	3
Herbert River	16,255	3
Johnstone River	9,554	2
Cairns and Douglas	7,209	3
Totals	97,916	80

It will be noted that mills were then operating in the Ipswich, Brisbane, and Rockhampton districts.

Bounties on Continental Sugars.

The bounties granted by Continental countries on sugar manufactured by them were a very sore point in Queensland and other British sugar-producing places. In 1899 the following countries gave an export bounty on sugar, viz.:—France, Germany, Austria, Hungary, Denmark, Russia, and the Argentine Republic, thus unfairly competing with Australian-grown sugar, and wherever the English language was spoken a strong feeling was being manifested against the bounties, and in all parts of the Empire immediate and prompt action was being taken to countervail same. Mr. Chamberlain declared that the "Abominable bounties must come to an end," and influential papers in England were strongly advocating their abolition or a countervailing duty.

Note.—This bounty system got worse in the following years, and was complicated by a system of "cartels." Finally a big convention met at Brussels, and about 1903 both cartels and bounties were abolished.

[TO BE CONTINUED.]

PIN-HOLE BORERS OF THE WALNUT BEAN (*Endiandra palmerstoni*).

By J. HAROLD SMITH, M.Sc., Entomological Branch.

THE timber trade in any country passes through many phases before forest operations are planned in accordance with an ordered scheme inspired by an accurate knowledge of timber values, the purposes to which the several woods may be put, and the markets in which they can best be placed. In recent years, a growing appreciation of the walnut bean, *Endiandra palmerstoni*, for veneer purposes has focussed attention on North Queensland scrub woods. American manufacturers, keen to appreciate variations in the public veneer taste, found this timber of considerable value for the trade; hence during the past few years there have been considerable inquiries for this timber in the log, and some very heavy shipments have left the Cairns wharves for the United States. The early consignments were naturally viewed with a critical eye, for the characteristics of the wood were more or less unknown, and the most suitable technique for handling the logs from the stump to the knife had still to be formulated. A variety of the logs, cut in all sorts of ways and from a great range of trees, was shipped and milled at the discretion of the purchasing interests. Inevitably, certain criticisms were made by these interests on the nature of the wood supplied and the condition in which it was sent to the mill; hence subsequent supplies have been cut and shipped in closer conformity with the manufacturers' requirements when these had been formulated with any degree of precision.

One rather serious criticism concerned the activities of insects in the heart wood of some of the logs—in particular a pin-hole borer, which was stated to have riddled quite a number and made them useless for veneer purposes. Specimens of the insects were forwarded to the Forestry Board and referred to the Entomological Branch of the Department of Agriculture and Stock. Following a discussion of the problem, it was decided to initiate studies of the walnut bean insect fauna, and field work commenced in the summer of 1930-31. This progress report summarises relevant data procured to date, and discusses in some detail the implications on forest operations and other handling processes before the logs are finally milled.

The Properties of the Walnut Bean.

The walnut bean occurs irregularly through the mixed rain forests of the far north and has been logged principally from the rich scrub lands, just across the coastal range, between Innisfail and Cairns. Precise ecological information is slight, but some districts carry a relatively considerable stand, while others, apparently similar in every way, lack representatives entirely. Supplies have hitherto been culled from both private and Crown lands wherever the tree has been within reasonable access. The heart wood is deep chocolate in colour, and if feathered is highly prized for veneer, while even the normal log is of considerable value. Unfortunately, most of the logs show structural defects of one kind or another. Many are piped and the cavity may extend through the greater part of the log; some show ringshakes; fissures along the

line of the medullary rays are frequent, while minor defects such as bark inclusions are anything but rare. Consequently less latitude is permissible in the bench treatment than is usual when the American species is being cut. Where practicable, the log is quartered on the bench and the quarter cut flitch is the rule, being varied to meet the peculiarities of the logs, and in this form the flitches pass to the boilers preparatory to slicing. A certain amount of wastage is inevitable, the amount depending on the quality of the log, but the specifications now used by the Forestry Board permit the export of logs carrying not more than 15 per cent. of estimated waste in the total volume of the log. The bulk of the logs shipped would, however, carry less than 10 per cent.—quite an appreciable fraction when freight is taken into consideration.

A logging complication arises out of the fact that it is almost impossible to ascertain if a standing tree is structurally sound. Sounding prior to felling gives no indication of the nature or extent of existing defects, and trees must be cut on the offchance that logs taken from them will be marketable. Hence it often happens that trees of apparent dubious value prove to contain excellent veneer material when felled and *vice versa.* There seems to be no escape from this position as, for some years to come, all the walnut bean marketed will be drawn from virgin forests and shipments will include numbers of post-mature trees.

Significance of Insects in the Walnut Bean.

Though shot-hole and pin-hole borers attack both soft and hard wood scrub timbers at certain times of the year, the injury must be particularly severe to lessen materially their value for ordinary structural purposes. The walnut bean is, however, cut for a special trade in which insect injury to the heartwood is highly undesirable. As a rule Platypodids of shot-hole dimensions rarely pass beyond the sapwood of the harder scrub woods, in which group the walnut bean may be included. If they do, it is only under special conditions such as may be found where the fungi responsible for dozy heart are operating, either in the solid wood or on fissure surfaces. Hence from the practical point of view the field of interest may be restricted to pin-hole species known to affect sound heart wood (Plate 84). The first recoveries from exported logs incriminated *Crossotarsus grevilleæ* Lea (Plate 85), the smallest of Australian Platypodids, and subsequent work has confirmed the wider generalisation which makes this species the principal pest. The burrows are so small that they may not be observed if the flitches are cursorily viewed on the bench, but, of course, the defects show out clearly once the wood is sliced. Purchasers have claimed that losses through pin-hole borers have, in the past, been considerable, and this claim will be commented on later. Perhaps when logging was ill organised, inferior timber was shipped and there may have been some grounds for such complaints.

Nature of the Investigation.

An accurate survey of the borer complex in the walnut bean must necessarily precede any practical recommendations for the control of the pest. Hence some attention has been given to the study of the insects associated with logs after felling, the mode of attack which characteristises each, and the ecological conditions under which they work. For this purpose, logs have been felled on two forest reserves and the

PLATE 84.

Crossotarsus grevilleæ Lea. Heartwood damage in walnut bean.

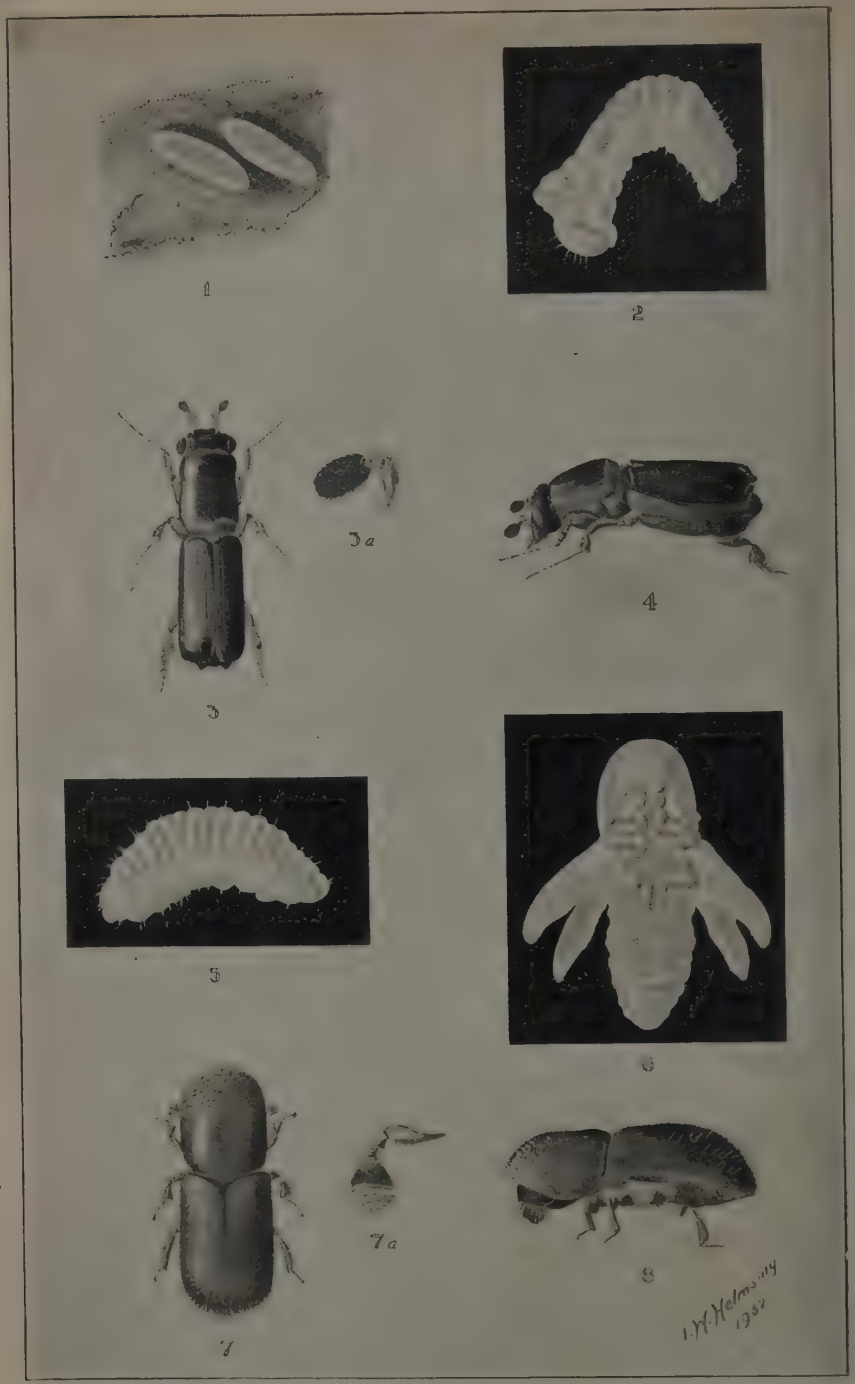


PLATE 85.

Crossotarsus grevilleæ Lea.

Fig. 1. Eggs × 34.
Fig. 2. Larva × 15.
Fig. 3. Adult (Dorsal View) × 15.
Fig 3A. Antenna × 60.
Fig. 4. Adult (Lateral View) × 15.

Xyleborus hirsutus Lea.

Fig. 5. Larva × 15.
Fig. 6. Pupa × 15.
Fig. 7. Adult (Dorsal View) × 15.
Fig. 7A. Antenna × 60.
Fig. 8. Adult (Lateral View) × 15.

insect activity in them followed through the early months of 1931, when the borer activities were at their peak. Sections of these logs were arranged in a variety of positions both in the scrub and outside in the open for comparison. The two reserves are at Wongabel and Gadgarra where resident foresters were available to carry out the work. The former lies near Atherton, on the dry end of the Tableland, while Gadgarra is situated closer into the range in a district of heavy precipitation. The rainfall at Wongabel was 21 inches for the first six months of 1931, while at Gadgarra 42 inches fell during the same period. In both places, the essential procedure was as follows:—From a tree cut in December, 1930, two 7-foot logs were sawn, one being hauled well into the scrub, while the other was dragged into the open where scrub influences on shade, humidity, &c., were less pronounced. Each of these was in turn halved, one section being left resting on the ground, while the other was raised on skids some 4 inches thick to permit adequate ventilation of the under surfaces. In late January, 1931, the sap wood was removed for a foot round the entire girth from the end of one piece, both in the scrub and the open, in order to expose the heart wood to direct lateral infestation, while strips of bark were removed from the upper surfaces as a check on bark influences in the insect fauna. Wood samples were axed from the logs at frequent intervals to provide material for closer examination than was possible in the field. Ants of the genus *Pheidole* played havoc with these during transport, but sufficient material was usually available to procure progress notes on the activity of the pin-hole species which attacked the wood.

Seasonal Conditions.

In North Queensland, monsoonal rains commence as a rule in late December and are preceded for some weeks by a succession of storms. Borers appear on the wing during the latter, and reach their numerical peak during the early months of the year. The summer 1930-31 was, however, quite unusual. November falls held promise of early general rains, but these failed to materialise until late in January; hence the logs encountered dry conditions for some three or four weeks after felling, at which stage the flight broods of the borer species were subnormal. Gadgarra rains for the first six months kept close to the average annual record, but precipitation at Wongabel was decidedly subnormal.

Insects Attacking the Walnut Bean.

Two pin-hole borers attack walnut bean logs shortly after they are brought to the ground in the summer months. One, *Xyleborus hirsutus* Lea (Plate 85), a typical member of the genus to which it belongs, has a wide distribution through the Eastern States, while the other, *Crossotarsus grevilleæ* Lea, is a Platypodid originally described from the southern silky oak, *Grevillea robusta*. More recent records of the latter species are all from the walnut bean, either as pests of the felled log or in the stumps and tops left in the forest after the logs are removed. A second species of *Crossotarsus* is of minor importance. The two commoner Platypodids of shot-hole size, *Platypus australis* Chapius and *P. omnivorus* Lea, riddle many of the scrub soft woods. The former, together with an unidentified species, shows some partiality for the sap wood of the walnut bean.

Development of the Attack.

When logs are left lying on the ground, changes gradually take place which have a considerable bearing on insect activities. If exposed to the sun, the bark quickly dries out and the shrinkage involves longitudinal splitting and the separation of bark from sapwood within a few weeks. Such changes take place normally when a log is hauled on to the ramp and left lying there for despatch to the wharf at a later date. On the other hand the humid and sheltered conditions peculiar to the depths of virgin rain forest preclude rapid drying out, hence a log left where it is cut for any length of time is subject to soaking and leaching rather than solar processes, and bark disintegration is consequently much slower.

In the experimental logs left in the scrub at Gadgarra, pin-hole borers soon alighted on the lateral surfaces of the logs and commenced to burrow. But, frequently as these burrows were initiated, they were invariably empty on examination at a later date, being for the most part but blind tunnels in the bark about one millimetre in depth. Scolytoid shot-hole borers, in contrast to the pin-hole species, penetrated through the bark to the sapwood without any apparent trouble. Marauding ants may explain some of the empty burrows of the pin-hole species, but it seems much more probable that the intact fresh bark hampers the normal propensities of the pests. The natural resistance to immediate pin-hole borer infestation through the bark steadily dimishes following leaching and exposure. Consequently, immediately after felling, only the ends of the logs are exposed to infestation, and there the attack is restricted to species of *Crossotarsus*. Both the heart and sapwood may be invaded at the ends of the logs, the entrance holes being scattered irregularly over the surface, but with the majority in the sapwood. There is no aggregation of burrows such as characterises shot-hole borer activities near the bark and in dozy wood tissues.

About the fifth week, the repellent properties of the bark diminished to a point at which the pin-hole borers could penetrate direct through the bark and the Xyleborid initiated the advance. Drippings from foliage overhead, heavy rain, and slow evaporation within the scrub were such that moisture had soaked through the weaker parts of the bark covering and caused some discolouration of the sapwood below. Traced back to their source, the older burrows led inevitably to these weaker parts of the bark. It would therefore appear that infestation by *X. hirsutus* follows closely the line of soakage through the bark. As the bark loosens at a later stage, other species may begin to operate more or less freely.

Once through the bark, *X. hirsutus* tunnels for some time on the surface of the sapwood in a tangential plane before entering the wood, hence where many insects of this species have been operating, the removal of the bark shows a superficial tracery made up of the preliminary hirsutus burrows. The direction of the burrows changes abruptly when the insect enters the sapwood, and this may subsequently teem with the tunnels of the insect. Both mature and immature forms may be found together in the same burrow.

A significant difference in the habits of *X. hirsutus* and *C. grevilleæ* may be noted here. The former enters the log only through the bark, while the latter must enter through an exposed surface, either a sawn

PLATE 86.

Dysoperrhivus grandis Lea. Meandering bark burrows of larvæ.

PLATE 87.

Xyleborus hirsutus Lea. Sub-bark preliminary burrows. Bark removed recently.

face or a scarfed edge cut with an axe. Ordinarily *C. grevilleæ* does not enter the lateral surface of the log until the natural shrinkage of the bark exposes the sapwood. Consequently, of the pin-hole species, the end penetration of the log is entirely Platypodid in origin. When the bark has been subject to scrub weathering for some time, *X. hirsutus* may penetrate the still intact bark. In the experimental logs the free use of the axe gave access to Platypodids at the sides of the samples earlier than would have ordinarily been the case.

One consequence of the succession was the intermingling of species within the log. In the early stages a pure infestation of Xyleborids was operating on the upper surface of the logs, but later both Xyleborid and *Crossotarsus* burrows occurred in close association. The adults, whose structural characters are, of course, distinct, can be readily separated, but larval identification is much more difficult and life history studies are therefore somewhat complicated.

In neither of the scrub logs at Gadgarra did the Xyleborid penetrate the heartwood, though the tunnels passed through the whole of the adjoining sapwood. Walnut bean does not possess the clear distinction between heart and sap woods, such as is found, for example, in the black bean *Castanospermum australe*. The transition is much more gradual, particularly if the tree from which the log has been cut is submature. Still the heartwood remains quite sound, and the value of the log for veneer purposes would not have been seriously impaired by the activities of the pest. The only material loss would have been that effected by *C. grevilleæ* at the ends.

Xyleborid penetration took place mainly on the upper surface of the two scrub logs. End penetration by the Platypodid was, by contrast, subject to no particular orientation. Skids made no appreciable difference to the infestation of the two logs, for undergrowth very quickly nullifies any beneficial effect which might be anticipated from aeration of the outer surfaces of the logs.

The two sections of the log out in the open permitted observations under an entirely different set of conditions, less suitable, theoretically, to the ecological requirements of the pin-hole borers. Both lay in an east-west position so that the sun played along the upper surface for the greater part of the day. The physical effects of exposure were soon evident in the loosened and split bark, both on the top and the sides. Borer damage was entirely of the Platypodid type, and entrance to the timber was effected only at the western end of a single log which possessed a fracture spur, sufficiently large to shelter the lower end surface from the sun. Here again there was direct penetration of the end wood by the insect, though the preference was mainly for the sapwood. The bulk of the effective entrance holes were on the lower half of the log.

Though entrance apertures of *C. grevilleæ* occurred in these logs, the burrows were either empty or harboured moribund adults, immature forms being quite absent. It is presumed that the solar heat is sufficient to prevent access of the insects during the day, while those which may effect an entrance during the night find conditions within the log quite inimicable to their general welfare. This aspect of the subject will be discussed later when practical control measures are being considered.

The duplication of the work at Wongabel confirmed the same general conclusions drawn from the Gadgarra material, with the noticeable difference that Xyleborids made no attempt to invade the logs—Platypodids being solely responsible for the borer injury. In any case, the infestation was slight in the scrub specimens and negligible for those left in the open. The tree felled at Wongabel was the younger of the two trees and should, under the same conditions, have suffered more severely than that at Gadgarra. The difference must therefore be placed to the credit of the variation in climatic conditions between the two areas.

Succession of Species.

During the leaching process which occurs in the scrub, another insect takes possession of the site between the bark and wood. This form was first noted in March, 1931, some three months after the trees had been felled at both Wongabel and Gadgarra, and by August the intact bark sheltered both larvæ and pupæ. The timber itself is unaffected, the tunnels being made in the bark and packed with the frass and wood debris associated with the activities of the insect, while the pupal chamber is cut very close to the outer surface (Plate 86). When reared the adult proved to be *Dysoperrhinus grandis* Lea. This insect has no apparent economic significance, but is of interest in the pest succession peculiar to felled walnut logs.

Life History Notes of Species.

The study of any particular species is a matter of some considerable difficulty, for material collected in the field invariably represents more than a single insect type. The range of insects in rain forests is so wide and the number of hosts suited to individual species so indefinite that laboratory work must preface any exact statement of the habits of any one form. This raises a further difficulty, viz., the handling of Xyleborids or Platypodids in the laboratory under conditions, which, no matter how well arranged, must differ from the natural habitat in some significant particular. The rain forest environment with shade, filtered light, humidity, even temperatures, &c., is hard to reproduce under laboratory conditions, while logs simply cannot be handled at all.

Hence the following observations merely throw together information gleamed from (*a*) The cutting up of 12 by 12 by 4 inches sections from infested logs cut at intervals for the examination of the insects enclosed, and (*b*) the implication of experiments, mostly abortive, initiated in the laboratory to elucidate particular points in the life history of the insects.

Xyleborus hirsutus Lea.

For the purposes of discussion, this is considered to be the only species of the genus handled in the experimental logs and in the laboratory. The adult (Plate 85, fig. 7) has typical Ipid characters, such as the ventrally placed head and short first tarsal segments, which make it readily separable from Platypodids, with a rectilinear body and long first tarsal segment. Where larvæ are working in conjunction, the two types may be distinguished by the brown dorsal loop on the prothorax of Platypodid larvæ (Plate 85, fig. 2)—a structure which is absent from the associated Xyleborids. (Plate 85, fig. 5.) These major distinctions

PLATE 88.

Indicating borer preference for leached sun crack.

PLATE 89.

Crossotarsus grevilleæ Lea. Showing damage in external surface, sapwood and heartwood.

between the two groups, while satisfactory for primary distinctions, must be viewed with some caution, for each group contains a number of species which may be working in the same log.

X. hirsutus enters the timber through the bark only and not on the sawn surface of the wood, but, even so, it seems very doubtful if the insects can bore through intact bark immediately the tree is felled. Preliminary soaking and leaching preceded successful attacks at Gadgarra, while even when the bark had been pierced, tangential burrowing took place before the sapwood was entered. (Plate 87.) Though Xyleborids are known to be partial to fresh wood in which the cell contents are still unaltered, it may be the peculiar property of walnut bean that certain changes must take place in the properties of the wood before the insects are free to tunnel in any and every direction. The tangential burrows of the insect possess few distinctive features. For the most part, they consist of simple meandering tracks changing direction abruptly at the point where the insect enters the log. A few are bifurcate, and some exceed an inch and a-half in length. Once the period of superficial burrowing is over, the insect enters the wood at an angle to the radial line and may pass through to the inner limits of the sapwood. Most burrows flatten out to a tangential plane before proceeding so far. Larvæ, pupæ, and adults may be found together within the one burrow.

Pupæ (Plate 85, fig. 6) were recovered from the tunnels in February, 1931, and in samples of wood examined later, both the immature stages were found throughout the burrows of the insect. The obvious inference is that more than one brood occurs during the wet season, though how many broods occupy the twelfth-month period is difficult to estimate. No signs of brood chambers in which larval development takes place have been found in either this species or the Platypodid.

Crossotarsus grevilleae Lea.

C. grevilleæ (Plate 85, fig. 3), the dominant species of significance as a pest of walnut bean, has certain characters which distinguish it from the Xyleborid so far discussed. The insect happens to be very common during the wet season and few, if any, logs cut at that time escape its attacks.

Infestation takes place on any surface where the wood is unprotected by the bark, hence imagines first enter at the ends of the felled log, mainly in the sapwood, but also to some extent in the heartwood. Should some of the bark be torn off during haulage with consequent exposure of the barrel of the log, or an axe ring be cut—as so often happens to secure official girth measurements—an entrance may be effected where the sapwood is exposed. Otherwise, so long as the bark remains intact, only the ends and fissures are affected, population of the remainder of the log being deferred until such time as exposure loosens the bark and allows access to the pest through cracks and abrasions.

As would be expected, the pest being the smallest described Platypodid, the tunnels are much more minute than those of the associated Xyleborids. The essential conformation of the tunnel is, however, much the same, brood chambers being absent while the entrance tunnel is also cut at an acute angle to the surface. For the most part, the pest

prefers the sapwood, but under suitable conditions, such as are common to the rain forest interior, the heartwood may be riddled by the burrows of this borer throughout the whole length of the log.

During the period when the experimental logs have been under observation, no pupæ of this species have been found, though they may be freely recovered from logs which have lain on the ground for twelve months or so. It would appear, therefore, that the life cycle of this species takes much longer than that of *X. hirsutus*. Perhaps this will explain the discovery of larvæ of *C. grevilleæ* in the heartwood of logs which have been exposed in the open for some considerable time, months after the outside of the wood exercises any attraction to the insect.

Contrast of Xyleborid and Platypodid Habits in Walnut Bean.

(*a*) *X. hirsutus* attacks the log through the bark only, while *C. grevilleæ* enters through exposed surfaces of the wood only.

(*b*) *X. hirsutus* has at least two and perhaps more than two generations per annum; *C. grevilleæ* appears to have no more than one.

(*c*) *X. hirsutus* does not penetrate the heartwood under normal rain forest conditions; *C. grevilleæ* may penetrate the heartwood.

(*d*) *X. hirsutus* cannot persist in the log for more than a few months; *C. grevilleæ* may infest logs for at least two years.

The economic significance of this information lies in the relative status of the two pests. Walnut bean for veneer purposes requires a heartwood free from defects—the condition of the sapwood is quite a secondary matter, consequently, control measures for borers in walnut bean must be specifically directed towards *C. grevilleæ*, the pest partial to the heartwood of the commercial log.

Feeding Habits of Borer Insects.

The tunnels of pin-hole borers in most species of timber have their walls discoloured through the action of various fungi which subsist on the wood which constitutes the walls. Should such tunnels lose their tenant, the mycelial development is so considerable that the burrows become blocked with a compact hyphal mass, often sufficiently strong to remain intact when the timber is broken up for examination. Prior to this stage, the fruiting bodies may be discerned fringing the walls of the borer tracks.

A number of fungi have been cultured, some directly from the fruiting bodies found on the walls, others from pieces of wood taken from the path of the tunnel. From the walnut bean, a species of *Monilia* has to be recorded, though the systematic position of the group is such that specific identification is impossible. Fungi assigned to this genus are usually considered to be imperfect stages of the higher Ascomycetes. A second fungus located in the pin-hole burrow belongs to the genus *Penicillium*, and the broom-shaped fruiting bodies almost touch each other in the centre of the tunnel. Many fungi of this type are saprophytic in habit, and this form may subsist on the debris inseparable from any insect habitation. The cultures were submitted to Mr. R. B. Morwood, M.Sc., Assistant Plant Pathologist, who is responsible for the identifications.

Pin-hole borers and shot-hole borers are usually classed as "ambrosia beetles," a name given to the group because some, if not all their members, feed on certain fungi specially cultivated for food on the walls of the burrows. More recently, it has been suggested that the larvæ of some species are essentially sap feeders, subsisting on the fluid contents of the wood rather than on special cultivated fungi. The biological requirements of the species under discussion are insufficiently known to warrant an opinion as to their habits. But either thesis must be viewed in the light of two facts—(*a*) That brood chambers are absent in both *X. hirsutus* and *C. grevilleæ;* (*b*) that fungi can be recovered from the burrows of both insects. The first would suggest non-specialised habits of the insects, while the second might indicate, especially as some of the fungi are unusual, that they have more than a mere accidental relationship with the insects which live in the burrow.

Borer Incidence and Logging Practice.

Under ordinary circumstances, logging is restricted to the drier months of the year, for haulage conditions in the scrub tend to hamper timber movements in the wet season. Hence, when the borer pests are most active—i.e., December-March—forest operations are almost at a standstill. This generalisation may, however, be varied if the overseas demand for walnut bean is sufficiently urgent. In the summer 1930-31, for example, such an inquiry in December prompted great activity in January, and the shipment when examined at the wharf prompted some misgiving, for borers, almost entirely of the grevilleæ type, infested the ends of most logs. It may be presumed that the losses when cut for veneer were not excessive and well within the limits imposed at the time of inspection by the forest officers concerned.

Considerable variations exist with regard to logging practices in the north. If fresh trees are felled when in a healthy growing state and hauled to the ramp for immediate shipment to their destination, the time interval during which the borers may work in a habitat suited to their needs is not great; hence the importance of such pests in the dry season is almost negligible. By contrast, initial infestation in the wet season may be high, though if the log is removed from the forest immediately, the scope of the attack is cut down to a minimum and the loss to the veneer manufacturer is slight.

In any large shipment of logs, a considerable number may be faulted structurally by such defects as piped stems—common in old trees affected with dozy hearts; ring shakes—a tangential fracture induced at the time of felling—and some others of less importance from the borer point of view. The significance of these two specified defects and a third, viz., ordinary longitudinal splitting, depends entirely on the fact that they give access to borers capable of attacking the heartwood through the greater part of the log. The structural defect may in itself reduce the amount of veneerable wood within the log, but should grevilleæ infestation supervene, following dumping where the insect can operate freely, the whole may be made valueless for this specific purpose. The importance of central infestation is enhanced by the fact that, while the development of insects penetrating the log from outside may be inhibited by solar influences, no such restriction is imposed on insects within the heart of the log. The obvious corollary is, of course, that logs with structural defects allowing access to the

heart wood of the timber cannot be safely harvested during the summer months—especially if some time has to elapse before the logs reach the bench.

Some years ago, when the boom demand for walnut bean swept over the Tableland, a number of logs cut from dying trees in the scrub or from trees left standing when rain forest was being cleared for pasture purposes, were shipped overseas. It has been suggested that the complaints of borer losses made by various buyers spring largely from these, and in this connection some generalisations from observations made during the course of this work may be made. Walnut bean trees of mature dimensions, standing in pasture land some fifteen years of age, now lacking sapwood and charred through the influence of successive grass fires, have been felled and found to have a heartwood free from pin-hole borer injury. Normally clearing and burning off would take place during the winter and spring months when the pest is least active, and the subsequent exposure of the standing trees would prevent wholesale invasion of the wood by pests of this kind. It is more probable that borer-infested logs have been brought to the ground and have lain under essentially scrub conditions prior to burning off. A healthy tree, dying in the open through the destruction of the adjoining timber, would not be itself attacked—exposure would be sufficient protection. The play of the sun's rays on the trunk would be sufficient guarantee against heartwood infestation by *C. grevilleæ*. At Gadgarra, a number of ring-barked trees have also escaped attack. The explanation is probably similar, as the surrounding scrub has been sufficiently thinned to materially alter the immediate environment of the standing timber.

During recent years, borer considerations have prompted the marketing of logs in a variety of ways—with bark intact (save for the strip removed for girth measurement), semi-desapped (with the sapwood partly removed), and totally desapped. The last method is discouraged, as sun cracks quickly develop in sufficient quantity to reduce the amount of available heartwood, though freight considerations prompt its partial continuance. From the entomological point of view, it will be clear that desapping is inadvisable, at least in the warmer months, for the bark itself acts as an efficient safeguard against grevilleæ infestation for some time after felling, while insects which may subsequently become established in the sapwood are there subject to solar influences. Timber handling must be essentially related to the habits of *C. grevilleæ* in any effective measures of control.

The source of borer logs in which the heartwood has been infested by the insects can be inferred from the previous discussion. If structurally sound, they must have been felled in the summer, when adults are plentiful on the wing, and allowed to remain in the scrub environment for some considerable time. If unsound, through ring cracks, piped stems, &c.—and most heart-affected logs are of this type—they will in all probability have been cut in the wet season, but may, or may not, have lain in the scrub subsequently.

The following conclusions inevitably are suggested as worthy of consideration in mapping out logging operations:—

(*a*) All logging should, if practicable, be completed during the winter months.

(*b*) If summer logging is imperative, only trees believed to be sound should be cut, while any shattered in the process should be disposed of locally.

(*c*) All logs should be removed from the scrub as soon as they are felled and placed in the open.

(*d*) The bark should be left intact as it affords protection to the log from insect infestation, and is also of assistance to the inspector in determining the probable age of the log.

(*e*) The ends of logs could well be covered with some repellent substance when cut to prevent end infestation by *C. grevilleæ*.

Inspection of Borer Infested Logs for Export.

The development of any export trade in walnut bean logs for specifically veneer purposes required that the Forestry Board should exercise some control over the quality of the shipments. At first, the purchasers, knowing little about the timber, apart from its value for veneer, were unable to draft specifications suited to the growth-habit of the tree and the logging conditions peculiar to North Queensland; hence the earlier shipments included a variety of logs many of which would be unsuited to the precise requirements of the trade through defects of various kinds. One such defect, about which much discussion has turned, incriminated the pin-hole borer as the cause of heartwood destruction, by which a number of logs superficially satisfactory actually milled into valueless veneer.

Subsequent official inspection of a more rigid type was therefore imposed, and a considerable number of condemned logs accumulated on the Cairns wharf over a period of two or three years. The reasons for the rejection of these logs were several, some on account of the structural flaws, and others because the borer infestation seemed more than was reasonable. Most of the logs showed some borer activities, some slight, others considerable. Some of these were purchased by the local sawmillers and passed through the bench for ordinary milling purposes. A number were examined when being cut, and after correlating the external borer-holes and the extent of the damage to the heartwood, there seems no doubt that the extent of the actual losses has been somewhat exaggerated. When the end infestation is considerable, the amount of injured wood determined by sectional planing may be of the surprisingly high order of 18 inches. This must be well above the normal, and presumes exceptionally favourable conditions for the activity of the insects. When the heartwood is entirely riddled, end, fissure, and pipe infestation play a share, the last two being the more important. The extent of pipe infestation may often be gauged when the flitches are being dressed, for slab after slab may have to be cut from the heart side of the flitch before sound wood is reached.

In considering suitable specifications for the inspection of export logs, much depends on the inspector's ability to sum up the probable insect losses in any given log. To do this he must be able to grasp the significance of structural defects in the log for the insect economy—in this case, *C. grevilleæ*—and the main considerations deducible from the data already given would be—

(*a*) That in sound logs, only the end infestation is of any great moment to the buyer.

(*b*) That in piped, ringshaked or shattered logs, the risk of heartwood infestation is high in summer but comparatively slight in winter.

(*c*) That the final injury is a measure of the original insect population—governed at all times of the year by the rapidity with which the log is despatched from the stump to the ramp and thence to the bench.

Logs have been shipped under various specifications in the past, all containing some reference to borers. Some required that logs be free from borers—an almost impossible standard—while others gave the inspector power to make any deductions from the timber measurements to compensate the purchaser for conjectured losses through the insect. Any valid inspection cannot but be based on the latter system, and the following criteria are suggested as a guide to inspectors required to issue certificates for walnut bean logs being shipped overseas:—

(*a*) Sound logs without end cracks, pipes or ringshakes, to be subject only to deduction for end losses if entrance holes of *C. grevilleæ* are visible in the heartwood. The maximum deduction should only be made during the summer months when the heartwood is clearly heavily infested. In winter the deductions may be reduced to negligible proportions.

(*b*) Cracked and fissured logs may be treated as sound logs if cut in midwinter, but deductions must be made during the summer if the logging history is unknown. Such logs should not normally be allowed to pass the wharf during the warmer months of the year.

(*c*) Only logs considered to have been felled specially for any particular shipment should be certifiable.

Summary.

(*a*) The walnut bean, *Endiandra palmerstoni*, has, during recent years, assumed an importance as a source wood for veneer manufacturers, particularly in America, but borer damage to the heartwood of some logs has been adversely criticised.

(*b*) The species mainly responsible is *Crossotarsus grevilleæ* Lea, a minute Platypodid. Its economic significance, its relationship to other insects which attack walnut bean, and the conditions favourable to its activity are enumerated.

(*c*) The relationship to logging practices is indicated, and stress laid on the need for expedition in forest operations.

(*d*) Information derived from a study of the life history of this insect and the associated *Xyleborus hirsutus* Lea, make possible specifications suited to the export trade.

Acknowledgments.

The suggestion for this investigation came from the Forestry Board, and the writer is indebted to its officers for collaborating in the work and introducing him to what is a rather complex industry. Headquarters staff have continually lent their aid in suggestions and a readiness to work through specialised material beyond his resources in Cairns. To these (in particular his Chief, Mr. Robert Veitch) he is very grateful.

SOILS.

By Dr. W. H. BRYAN, M.C., Lecturer in Geology, University of Queensland.*

THE subject of soils is one that should have a real interest for all Queenslanders. For, in a very literal sense, soils form the basis of our industrial life. Soils are more than mere collections of mineral particles. They furnish food and foothold for an infinite variety of plants, and these, in turn, provide sustenance for man and beast.

Ever since he first deserted the nomadic life of a hunter and settled on the land, man has been interested in soils from the point of view of their productivity. As a result of the trials and errors of thousands of years he has accumulated a mass of information dealing with this aspect of the subject. In recent years this knowledge has been supplemented by the work of scientists who in many parts of the world have been making a study of the *processes* which bring about the production of soils. This modern aspect of the study of soils is largely due to a group of Russian scientists. The huge extent of the Russian Empire, embracing as it does a varied assortment of geological, geographical, and climatic conditions, which are yet found in one continuous land mass, formed an excellent field for the study of the origin and formation of soils.

Soil Divisions.

Soils can be roughly divided into two great groups. The first group includes all those which have been carried to the position which they now occupy, through the agency of wind, ice, or running water, and which, therefore, bear no relationship to the underlying rock floor. These are known as soils of transportation. They include vast areas of valuable alluvial soil such as those in the valleys of the Nile, the Mississippi, and the Yang-tse-kiang. In Queensland they are well represented in our fertile river flats. Such soils are often of the very first importance from the economic point of view, but they do not throw much light on the way in which soils are produced.

The other great group is made up of soils formed in the places where they are now found, and which are, therefore, directly related to the underlying rocks. These may be called the sedentary soils, and it is with this group that I wish particularly to deal. The nature of these sedentary or residual soils must, in the early stages of their formation, be largely controlled by the nature of the rock beneath, but it is the belief of the modern soil expert that, in many cases, it is *climate* which is ultimately the dominating factor, so that, in the end, when the soil is at last mature, it may not resemble even remotely the rock from which it has been formed.

Composition of Soils.

Although most soils contain a smaller or larger amount of organic material, resulting from plant decay, they are essentially composed of substances derived from the rocks upon which they rest. The production of soil is brought about by two processes which may act independently, but which more often go hand in hand. The first of these processes results in the mechanical disintegration of the rock. As a result of purely physical causes, such as the alternate expansion and

* In a radio lecture from 4QG.

contraction during hot days followed by cold nights, the solid rock mass is gradually cracked and broken into smaller and smaller pieces. Such disintegration is a feature of deserts, the sands of which are composed of innumerable rock particles, each particle a sample of the unaltered parent rock. Consequently, these desert soils contain all the chemical constituents of the original rock, including those which are valuable as plant foods. The resulting fertility of many desert soils has been definitely established in those places where the lack of rainfall has been remedied by the introduction of irrigation schemes. There the promise is fulfilled, that "The desert shall rejoice and blossom like the rose."

If we turn now to the other important soil-forming process we find an interesting contrast. This second process is a purely chemical one, and brings about the decomposition of rocks, by a series of chemical reactions. The net result of these reactions is to dissolve out, and carry away in solution, many of the original substances composing the rock. This process is known as leaching, and it includes the removal of those elements which provide the mineral foods so necessary to plants. As these reactions need the presence of water, they are most potent in regions of heavy rainfall, and since increase in temperature accelerates them, rock decomposition is most marked in the humid tropics. If carried to the limit, this leaching results in the production of the so-called laterites, which are incapable of supporting any but a poor vegetative growth.

In these two extreme cases that we have considered, we have the seeming paradox that wonderfully fertile soils may be produced in the inhospitable desert, while barren soils may be formed in the heart of the luxuriant tropics. But the great majority of soils lie between these extremes, and are the result of mechanical disintegration and chemical decomposition acting hand in hand. Under these conditions the original rock masses are partly broken up and partly leached. If the leaching has been comparatively slight, the soil may still resemble the parent rock very closely. Such soils are termed skeletal. Since they bear such a close relationship to the underlying geological formations, it follows that a geological map of the area may be used as an accurate guide to their distribution. The sandy soils found on the granites of Southern Queensland afford good examples of these skeletal soils.

If chemical decomposition has been relatively more important than mechanical disintegration, the fact may show itself in one of two ways. In the first there results the removal of certain constituents from the whole thickness of the soil, as, for example, in the leaching of lime from many of our red volcanic soils in coastal Queensland. The second shows itself by the removal of constituents from the upper part of the soil, and their redeposition, and accumulation in the lower part, thereby bringing about two or more definite soil layers, or horizons. The upper of these corresponds to what is popularly known as the soil, and the lower to the subsoil. Right along the coastal strip of Queensland soils of this type are commonly developed. Usually the upper layer is light in colour and of a somewhat sandy texture, while the lower layer is darker and of a more clayey nature. In some cases this lower layer contains many small ironstone nodules, and occasionally, when these are numerous, they are cemented together to form a hard rock-like mass, known as a hard-pan.

Overshadowing Factors.

From a consideration of those facts that we have already dealt with, it is plain that, while many things may influence the nature of the soil formed in any particular place, there are two all important factors that overshadow all the others. These are the nature of the parent rock and the climate. The influence of the former is shown, for the most part, in arid regions and in young, immature soils, but, in addition, there are certain rocks, particularly those composed of a single mineral, which, by their very nature, are capable of giving rise only to a very restricted range of soil types, no matter what the climate may be. Thus a pure sandstone made up entirely of quartz grains would always produce a sandy soil. Hence certain sandstones produce the same barren soil in whatever part of Queensland they are found. On the other hand, a pure limestone could never give rise to such a soil. Most rocks are, however, composed of a number of different minerals, and, consequently, such rocks are all capable of giving rise to quite a wide range of soils, according to the climatic conditions governing their decomposition. Thus the basalts of Southern Queensland give rise to two distinct soil types, which differ in colour, texture, lime content, and the natural vegetation which each supports. The first of these is a black soil, which is typically developed on the Darling Downs, although it is found in many other parts of Queensland. This is a fertile soil, rich in plant foods. It shrinks amazingly in the dry weather, and develops great gaping cracks. After rain the soil swells rapidly and forms a black, tenacious clay, detested by motorists. It has become so usual to associate sticky clay soils, with black colour, that the name "Black Soil Plains" has been given to many areas in Central and Western Queensland, where the soil, though tenacious, is *not* black in colour but is some shade of brown. The other volcanic soil derived from basalts in Queensland is a deep, chocolate-coloured, or red, clay loam, which, in its native state, usually supports a luxuriant jungle growth. This soil, too, is largely composed of clay, but it is a clay with distinctly different properties from that of the black soil. It does not shrink and swell to nearly so great an extent, it is more friable, and less sticky, and it drains much more rapidly. It is not so rich in mineral foods, and in some cases is soon in need of lime. The similar red loamy soils about Brisbane are often referred to as volcanic soils. In some cases this is wrong, for a number of these soils have not been formed from basalts or any other volcanic rocks.

The influence of the climatic factor tends to develop, as nearly as may be, the same soil type under any one set of climatic conditions, irrespective of the rocks present. This is best shown in areas where the soils are very old and mature and where there are no extreme rock types present. For example, in Russia climate is so much more important than the geological factor that the soils are arranged in broad belts, which correspond quite closely to the several climatic zones, but which, seemingly, bear no relationship to the distribution of the geological formations. Thus the well-known Black Earth, famous for the wheat it produces, and similar in many respects to our own black soils, extends as a belt for thousands of square miles and is wonderfully uniform, although it overlies several quite distinct geological formations.

Another interesting example of climatic control producing the same soil type from two quite different rocks is furnished, when we compare the famous Cuban soil, known as the Matanzas, with the red soils of our

coastal regions. As a result of the two soils having been formed under similar climatic conditions, they are very similar in colour, texture, and other physical and chemical properties; they each support luxuriant rain forests in their native state, and are each ideal for the growing of sugar-cane, but, while the Cuban soil is formed from a limestone, the Queensland equivalent is formed from a basalt.

As a result of the interaction of innumerable rock types with varying climates there are, between the skeletal soils on the one hand and the fully leached soils on the other, a host of soils of many kinds, some of which may still show the mineralogical characters of their respective rocks, while others show signs of the more important influence wielded by climate.

This complexity is still farther increased by the introduction of a third factor, namely, physiography. In places where the topography is uniform over large areas, as, for example, on our western plains, soil variations due to this factor are negligible, but in the coastal highlands it is often very important. Change in elevation, or in aspect is usually accompanied by very local, but nevertheless important, changes of climate. Consequently, the same rock may give rise to quite different soils on an exposed ridge or in a sheltered valley. Physiography, too, controls largely the nature of the local drainage, and this, in its turn, must have far-reaching effects on the soil-forming processes. The interaction of all these factors can be well studied in the Brisbane area, for in and about the city and suburbs there is developed a wide range of geological formations, and the area is, in addition, one of considerable physiographic complexity.

MILK AND MAN.

The Arabs of the Sahara reckon their flocks most valuable property. They drink the ewes' milk regularly. Like the Syrian sheep, the Arab sheep are very prolific, generally lambing in spring and again in autumn. These two breeds are probably closely allied one to the other.

Captain Burnaby, in his book "A Ride to Khiva," says that "sheep make up the entire riches of the nomad tribes. A Kirghiz lives upon their milk during the summer and autumn."

Ewes fill the place of cows in Iceland, as many as 1,000 being kept by large farmers. They run on the hills during the summer, and are housed during the long winter.

Mare's milk plays a large part in the diet of Asiatic peoples, who rear large numbers of horses. Marco Polo, the Italian traveller of the thirteenth century, has recorded of the great Asiatic prince, Kublai Khan, that he kept over 10,000 pure white horses and mares, the milk of the latter being reserved for the Khan and his household, and the members of one great tribe who enjoyed the privilege of drinking it as a reward for military services rendered.

Asses' milk has been used from a remote period for human consumption. It was esteemed by the ancient Romans, and there is a certain demand for it in London at the present day for invalids' use.

Among other domestic animals used for milking purposes are the buffalo, employed for draught and plough in various parts of Asia and in some parts of South-Eastern Europe; the yak, used as a beast of burden in Tibet, whose milk is very similar to that of the cow, and is used also to make butter and cheese; the camel in Egypt and many parts of Asia; and in the Arctic regions of Europe and Asia the reindeer, upon which the Samoyedes and other nomadic tribes are dependent for their existence.

TOMATO CULTURE.

By Officers of the Fruit Branch, Department of Agriculture and Stock.

In recent years the production of tomatoes has materially increased, but taken as a whole it is doubtful whether the increase is proportionate to the larger area under this crop. Various factors have operated against the continuance of high yield, of which constant cropping of the same land is not the least important. The lack of efficient soil treatment, the introduction and establishment of disease in addition to such as may have already been established, and frequently insufficient attention all militate against high averages. It must also be admitted that the land cropped is not always of a nature best suited for tomato culture. These matters and points on grading and packing are discussed in these notes, which have been revised and added to by Mr. J. H. Gregory, Instructor in Fruit Packing.—Ed.

SOIL REQUIREMENTS.

A FINE alluvial loam with good fertility and efficient drainage is considered the most suitable, though excellent crops are also obtained from basaltic soils. Continuous cropping of the same land is not in any circumstances recommended; in fact, alternate sowing with green crops to plough into and maintain the supply of humus in the soil are necessary and will, in addition to maintaining the desired element in the soil, assist in retaining such fertilizers as are applied. Whatever green crops are used, the choice of variety depends upon local conditions. It should not be subject to eelworm or nematodes; therefore cow pea could not be recommended.

Maize sown broadcast and fairly closely provides a liberal supply of vegetable matter and is now receiving more general attention in this line. It will be found advantageous to apply the necessary fertiliser before planting the green crops so that a luxurious growth may be ensured; the fertilizing elements which have been absorbed by it will be returned to the soil when it is ploughed under.

Ground that becomes sodden in wet weather becomes rapidly hard and dry after rain. Where a small plot, generally referred to as a soak, exists it may, according to the situation, be worth while draining it with agricultural pipes, but draining large areas is not profitable.

Good preliminary cultivation is most essential. Land which has not been under cultivation previously or is deficient in any or all of the plant foods should be liberally fertilized. Unfortunately, farmyard or stable manure is rarely available in sufficient quantity (its deficiency is responsible for much ploughing under of cover crops to provide the necessary mould); consequently other fertilizing material must be applied, and the following formula is recommended:—1 to 1½ cwt. sulphate of ammonia, 5 cwt. of superphosphate, and 1½ to 2 cwt. of muriate (or sulphate) of potash per acre. These should be thoroughly mixed, spread evenly over the soil, worked into, and thoroughly incorporated with it.

Planting.

Planting is usually done in rows and the plants subsequently allowed to grow at will, practically covering the soil surface. Staking with or without wiring is seldom practised, the extra labour not being considered warranted, but this is open to question, particularly where the available land is limited. The distance between plants ordinarily varies according to soil and local conditions from 4 feet to 8 feet, or even more according to local conditions. Where grown with the aid of stakes (with or without wires) they may be planted 18 inches to 2 feet apart, and 3 feet between the rows. The plants are trained to a single stem from the outset, all laterals being removed close to the stem without injuring the main foliage and the terminal bud removed when the height of the support has been reached, the plant being trained vertically; all parts are accessible to applications against fungi or insect pests. Where stakes are plentiful and light, one to each plant is used, 4 feet to 5 feet being allowed above the ground level, the plants being tied to them in three or four places before reaching the top. By the use of fairly heavy posts sunk well into the ground at distances of about 30 feet apart wire may be used. These may be kept in position by "droppers" reaching a short distance into the soil. The advantages of this system are that clean cultivation can be much more readily

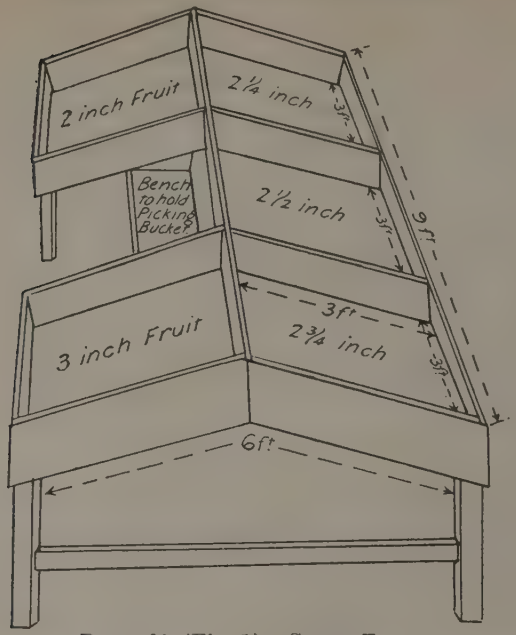


PLATE 90 (Fig. 1).—SIZING TABLE.

Diagram of sizing table containing bins for five sizes of tomatoes, and a space with bench built in to accommodate sizing hand.

Note.—This table should not be made too big, as this will cause rough handling of fruit.

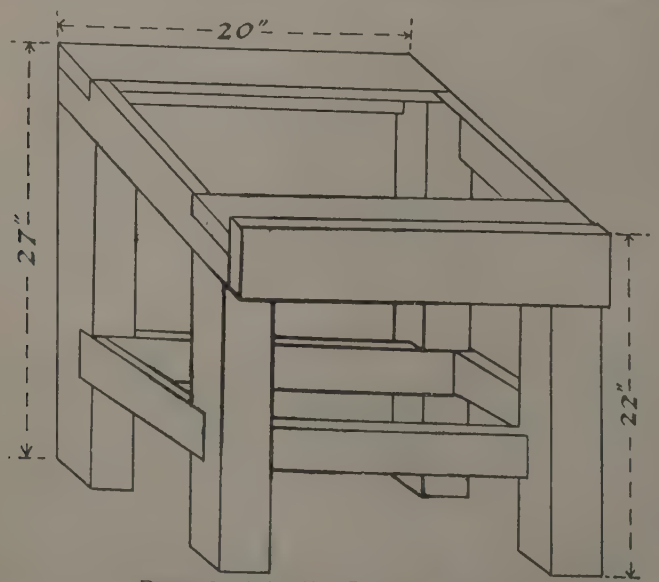


PLATE 91 (Fig. 2).—PACKING BENCH.

Diagram of a useful packing stand—height in front, 22 inches; height at back, 27 inches; distance from front to the back, 18 inches; legs, 3 inches x 3 inches; stays, 3 inches x 1 inch; front board, 5 inches x 1 inch. This stand should be made wide enough to hold two cases, thus permitting two counts to be packed at the same time from the sizing table.

practised; moisture is retained by lightly working the surface soil, and where necessary attention is given, practically no losses from blight nor caterpillar, also very much increased yields, in some instances over 100 per cent., are recorded.

Varieties.

As to varieties, preferences differ in every district, and no list of suitable varieties for all districts can be submitted. This is particularly instanced in the wilt-resistant properties claimed for Bowen Buckeye in the district of its origin, while under trial with a collection of other kinds a Hawkesbury proved to be the most susceptible to the disease. Growers have been advised repeatedly to save their own seeds from selected plants showing a combination of vigour, productivity, and even-shaped fruit of medium size. Excessively large fruit is generally prone to irregularity in shape, is seldom so freely produced, and for general purposes is not so much in demand as fruit of medium size. It is disappointing to note how few have accepted this advice, and it is a common practice to purchase imported seeds and to a lesser extent import seed direct from overseas. To lack of discrimination in this respect, the wide distribution of the ills which beset the plants are in a great measure responsible. As the tomato thrives so vigorously in this State it is reasonable to assume that an all-round improvement could be effected by selection, for it will be noted that odd plants in a plot show marked advantages over others in their vicinity.

Much has been said in favour of the wilt-resistant varieties, among which Norton has not been superseded. Such varieties are, however, not so widely sown as one would expect, and the inference is that they are not considered as profitable as those for which no such claims are made.

Raising the Plants.

Diversity of opinion exists as to the advantages of planting the seeds in the position where the plants are to remain. The practice may present disadvantages in districts of light rainfall, but under ordinary conditions it has a most important feature to commend it. In transplanting, no matter how careful the operation, many roots are broken, and where such breakages occur an opening is made for the entry of injurious bacteria. Where seed-beds must be provided, the same site should not be used for two seasons in succession.

Shade is sometimes necessary to secure even germination, and this can be obtained by the use of straw or even bags laid upon the ground in which the seed is planted, the covering being removed as soon as the young plants begin to appear through the soil. Before planting the seed the soil should be reduced to a fine tilth. That is important. Following planting the soil should be firmed either by beating with the back of a spade or shovel or completely treading it. A fine light layer of loose soil should then be scattered over the surface. In the absence of firming, the soil will frequently dry to a sufficient depth to prevent germination, even when watered daily.

Plants grown close together as seedlings in the seed-bed usually draw freely on the available moisture, and if this is not present make poor growth. An even and adequate supply of moisture is therefore necessary to develop robust plants, but for a day or two prior to transplanting (unless it should be during showery weather) watering should be entirely suspended.

In the field the land should be well prepared; deep working will assist the plants to withstand dry weather, and cultivation while it can be practised (throughout where staking is employed) will also materially help.

It is, unfortunately, a rather common sight to see rejected fruit scattered over the field, where it decays, and in the process provides a medium for the development and spread of diseases and pests. Instead of the old stalks, and as far as possible the foliage, being collected and burned as soon as the plants become unprofitable they are left until some later date and then more or less ploughed into the soil.

MARKETING TOMATOES.

Much has been written on the subject of marketing different fruits, but the essential facts are still the same; grading, sizing, packing, and an attractive get-up to the finished package are the things that count. The grower must study the needs of the consumer, retailer, and agent to get the best price for his product.

Consumers want tomatoes of good quality and in a condition that will induce them to buy more, so increasing the demand and disposing of greater quantities. Immature, small, or grubby fruit are not appreciated, and many of the householders getting fruit of this description from the retailer cease to buy tomatoes for a week or so, thus causing an over-supplied market, with the consequent drop in prices

PLATE 92 (Fig. 3).

Four specimens of tomatoes photographed on edge and on the flat, showing the uneven layer which would be obtained with tomatoes packed on the flat, and the even layer obtained by placing the fruit on its cheek as is done when using the Standard Cheek Pack.

These were four tomatoes taken from a case in the market measuring 2⅝ inches in diameter.

Retailers require tomatoes of a uniform quality to enable them to sell, if possible, 100 per cent. of good, sound, unblemished fruit, thus satisfying their customers and keeping up a demand.

Growers should remember that a good agent to handle their fruit is necessary, but the more important thing is to give a good agent good fruit to handle. Once the market receives bad fruit the demand ceases, prices drop, and agents then have difficulty in getting payable returns for the grower. Buyers will pick out the best packed and graded fruit, causing the grower of badly graded and packed lines to lose on his consignment. The advantages of good packing and grading are very pronounced on a slow market.

Grading.

With tomatoes, grading usually is the worst carried out operation, growers as a rule mixing all sizes and colours. We know that at the start of a season, owing to the small quantities of fruit ready to harvest, it is hard to separate all grades into separate cases, but this is an easy matter when the season is in full swing. Retail buyers and agents want fruit packed true to size and colour; fruit of a uniform size being either all green matured fruit fit for country orders or ripe fruit suitable for city and suburban trade. Growers in remote districts may possibly find difficulties in landing their tomatoes in perfect condition as regards colour on distant markets, but big improvements can be made by these growers. One sees in the markets fruit from distant districts almost totally green throughout the case, but having, perhaps, a dozen to twenty ripe or nearly ripe fruits in the case. A case of this description of pack is of no use to any buyer. If bought for country trade, the ripe fruit would be found running out of the box on arrival at its destination, and not being ripe throughout the case it is of no use for a city or suburban buyer. Some growers reverse this practice by having ripe tomatoes with a few green specimens included. Another bad fault is the packing of immature tomatoes. Many growers in trying to catch early markets pick before the fruit is mature, so giving it no chance to even ripen properly. The public, through buying immature fruit at the start of the season when prices are high, is turned against tomatoes with the consequent causing of the marketing troubles mentioned previously. Any immature fruit that may be packed by accident should be rejected when packing. Diseased, blemished, and cracked fruit should not be included; one or two specimens of this description lowers the value of the whole case.

Sizing.

For the successful packing of tomatoes sizing is absolutely necessary, and must be done before proceeding to pack. It is possible with citrus, apples, or pears to pack without sizing first, but with tomatoes it is essential to size first. At present we do not know of any sizer that is a complete success for sizing tomatoes, but the revolving roller and moving belt type of appliance is a big help. The best method for the grower with a small acreage is a sizing table, a diagram of which is shown (Fig. 1). This can easily be made at home. It is necessary to have the centre raised to allow the fruit to run to the edges of the table where the packers are working. This saves reaching for fruit. Packing operations are conducted from the sides of the bins or compartments of the table. To save throwing or rough handling on the part of the operator sizing the fruit, it is advisable not to make the table too big. Benches 3 feet by 3 feet are a good size; this would mean a table 9 feet long by 6 feet wide. There are five compartments for sizing, the space in the middle at one side being used by the sizer to stand in whilst sizing. A bench for standing the packing bucket on is a great convenience and time saver—allowing the sizer to use both hands for operations. Best results will be obtained where it is possible always to have the sizing done by the same person, who will soon become very fast and expert.

A packing stand to hold two cases can also be easily made (Fig. 2). Packers are advised to pick two sizes together from each bin.

Packing.

Many and varied are the ways one sees the operation of packing carried out. Flat packs, solid packs, and square packs all have their supporters, but the standard cheek pack with its pocket system has all the advantages; easy to learn and easy to do when following on the sizing operation, and all sizes will pack correctly. The most popular box for marketing tomatoes is the dump half bushel 18 inches by 8⅝ inches by 7¼ inches, but some growers use the half long-bushel case with a partition 26 inches

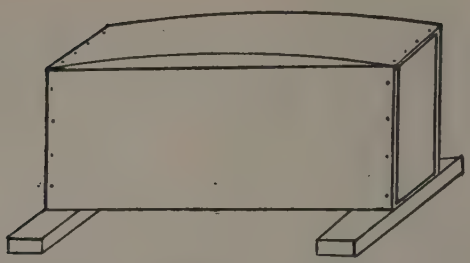
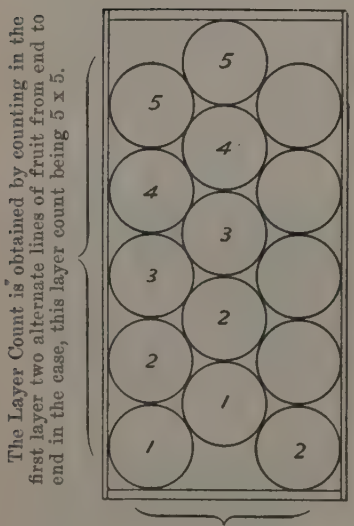


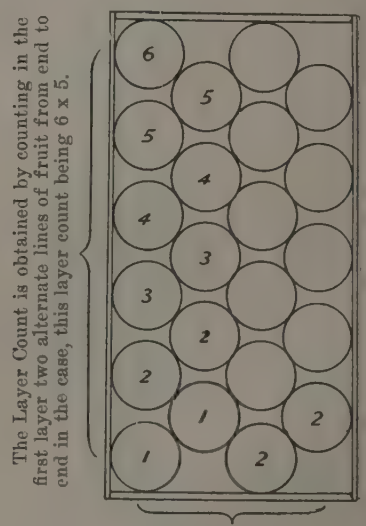
PLATE 93 (Fig. 4).—NAILING DOWN.

Method of placing two pieces of timber on the floor of shed. This makes a good solid nailing down bench, and permits the bottom of the case as well as the top to bulge slightly when the lid is nailed on.



2–1 PACK.

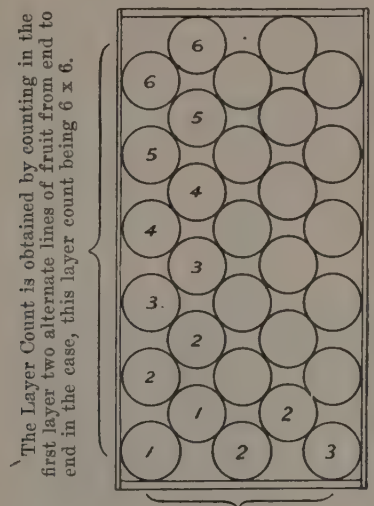
The Pack gets its name from the way the first three fruit are placed in the layer. The Count is made of the first two lines of fruit across the case.



2–2 PACK.

The Pack gets its name from the way the first four fruit are placed in the layer. The Count is made of the first two lines of fruit across the case.

PLATE 94.



3–2 Pack.

The Pack gets its name from the way the first five fruit are placed in the layer. The Count is made of the first two lines of fruit across the case.

Plate 95.

by 6 inches by 7½ inches. The advantages of the dump half bushel are as follows:—Easier and quicker to make up through having no partition, a better shape for handling, stacking, and carting, and, being wider, easier to pack into—allowing a packer more room to work with greater speed. Its shape also lends itself to displaying fruit to better advantage. Some packers make the dump half-bushel case the narrow way 18 inches long by 7⅛ inches wide by 8⅜ inches deep (Figs. 11 and 12), but with the flat type of tomato making it the broad way 18 inches long by 8⅜ inches wide by 7⅛ inches deep is to be preferred—allowing more room to work in, and giving fewer packs and counts (see packing tables), with greater ease in sizing. It also has fewer sizes that give trouble to the beginner in getting fruit up to the correct height in the case. The best plan is, where possible, to pack the tomatoes over-night, nailing them down and despatching the next day. Round type tomatoes pack easiest when cases are made the narrow way.

By studying the illustration (Fig. 3) of the four specimens of tomatoes shown on their cheek and on the flat there will be seen one of the great reasons why we use the cheek pack in preference to the flat pack. By placing fruit of a given diameter, which is the system of sizing used commercially, we get an even, level layer, but by placing fruit on the flat we get uneven layers to pack on, which greatly increases our difficulties in bringing the case up to an even face for lidding or for display purposes. It would also be impossible to have standard packs and counts if using any system but the standard diagonal cheek pack. Once a type of tomato of a given diameter is packed correctly the same type and size will always pack correctly and give the same count by using the same pack.

PACKS THAT WILL BRING FLAT TOMATOES TO THE CORRECT HEIGHT IN THE DUMP HALF-BUSHEL CASE.

In cases made on the wide system (Fig. 8), 18 in. long, 8¼ in. wide, 7⅛ in. deep.					In cases made on the narrow system (Figs. 11 and 12), 18 in. long, 7⅛ in. wide, 8¼ in. deep.				
Approx. Size.	Pack.	Layer Count.	Number of Layers	Total.	Approx. Size.	Pack.	Layer Count.	Number of Layers.	Total.
	3–2	9–9	4	180		3–2	8–7	6	225
	3–2	9–8	4	170		3–2	7–7	6	210*
2¾	3–2	8–8	4	160		3–2	7–6	6	195*
	3–2	8–7	4	150		2–2	9–9	5	180
2½	3–2	7–7	4	140		2–2	9–8	5	170
	3–2	7–6	4	130	2¼	2–2	8–8	5	160
	2–2	7–7	4	112*		2–2	8–7	5	150
	2–2	7–6	4	104*	2½	2–2	7–7	5	140
2¾	2–2	6–6	4	96*		2–2	7–6	5	130*
2¼	2–2	8–8	3	96		2–2	6–6	5	120*
	2–2	8–7	3	90		2–2	6–5	5	110*
	2–2	7–7	3	84	2¾	2–1	9–8	4	102
3	2–2	7–6	3	78		2–1	8–8	4	96
	2–2	6–6	3	72		2–1	8–7	4	90
	2–1	8–7	3	68		2–1	7–7	4	84
3¼	2–1	7–7	3	63*	3	2–1	7–6	4	78
						2–1	6–6	4	72
					3¼	2–1	6–5	4	66*
						2–1	5–5	4	60*
						2–1	6–5	3	50

* Denotes open packs.

Nailing down is best carried out by placing two battens lengthways on the floor so that the ends of the case will rest on them, allowing the bottom to bulge slightly when the lid is nailed on (Fig. 4).

The chief points of the standard pack are as follows. Memorising these will assist the beginner a great deal:—

1. All fruit to be placed on edge, that is, on its cheek;
2. Use three packs: 3—2, 2—2, and 2—1 (Fig. 6).
3. Two fruits must not rest directly one on top of the other but in the pockets formed by the spaces between the fruit of the previous layer (Fig. 7).
4. The height of the fruit in the case is governed by the size of the pockets in each layer (Figs. 9 and 10).
5. Correctly packed fruit is always placed in straight lines from end to end, across and diagonally in the case (Fig. 8), the fruit always being in alignment.

The illustrations show the method of carrying out the rules of packing, and also show the method of placing the fruit and arriving at the name of pack and layer count mentioned in the table of packing counts (see Fig. 5). Reference to the packing count table will give the beginner an idea of the pack to use for each size. Packing counts are given for the dump half case made both ways and for the long half-bushel case. A handy sizing gauge can be made by cutting holes 2 inches, 2¼ inches, 2½ inches, 2¾ inches, 3 inches, and 3¼ inches in diameter in a piece of plywood. A 2¼-inch fruit is one that will drop through a 2½-inch ring but not through a 2¼-inch ring: 2¼-inch is fruit that will not go through a 2½-inch ring but will drop through a 2¾-inch ring. The same method of measuring applies to the other sizes. It is necessary to make a good start in packing the case correctly, and great care should be taken to see that a good snug, firm, first layer with all fruit in alignment is packed. By placing the correct sized fruit in the pockets of the first and each successive layer the packer will soon learn to pack correctly. By studying the illustrations of the start of the second layer packers will see how the

3—2 pack, 8 x 7 layer, 4 layers in the case, total 150. The layer count is obtained by counting from end to end two side by side lines of fruit in the case. (*See* Fig. 5.)

2—2 pack, 7 x 6 layer, 3 layers in the case, total 78. The layer count is obtained by counting from end to end two side by side lines of fruit in the layer. (*See* Fig. 5.)

2—1 pack, 8 x 7 layer, 3 layers in the case, total 68. The layer count is obtained by counting from end to end the side by side lines of fruit in the layer. (*See* Fig. 5.)

First layer 3—2 pack. The pack gets its name from the first layer being started with three placed against the end of the case and then two being placed in the pockets formed by the three. This is repeated until the layer is full.

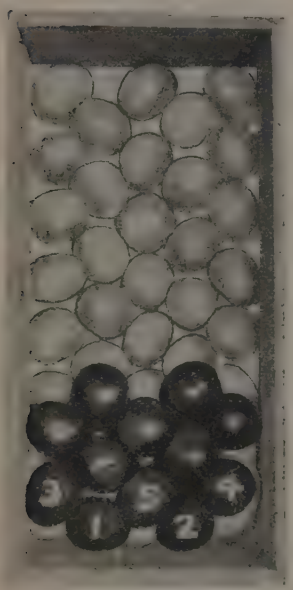
First layer 2—2 pack. The pack gets its name from the first layer being started with two placed against the end of the case and then two being placed in the pockets formed by the two. This is repeated until the layer is full.

First layer 2—1 pack. The pack gets its name from the first layer being started with two placed against the end of the case and then one being placed in the pocket so formed. This is repeated until the layer is full.

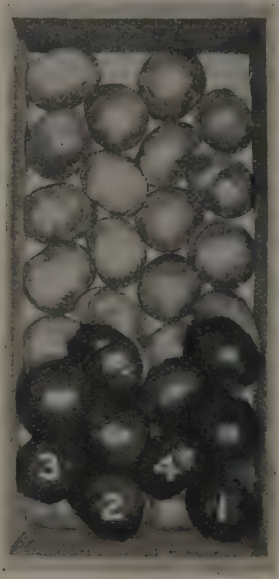
PLATE 96 (Fig. 6).—FIRST LAYERS OF THE 3—2, 2—2, AND 2—1 PACKS.
Note the order and position of placing each fruit.

second layer fits in the pockets of the first layer. The third layer is the same as the first, being placed in the pockets of the second layer. It is advisable not to try to pack too fast when first learning. Pace is acquired with practice.

That the height of the fruit is governed by the size of the pockets in each layer is the most important rule in packing to remember. The counts marked with an asterisk (*) are the counts that are likely to give trouble. As an example, we will take the flat type 2½-inch tomato, 2—2 pack, 7—6 count, with 104 tomatoes. Most packers would try to pack this 2—2 with closed pockets 8—8 count with three layers containing 96 tomatoes, which would come low (Fig. 9), but by opening the pockets and getting a 2—2 pack, 7—6 count, and four layers containing 104 tomatoes (Fig. 10) the case is brought to the correct height without any trouble. The difference in the two cases is: Incorrect count 3 layers of 32, total 96; correct count, 4 layers each containing 26, or 8 more tomatoes to the case. This pocket system can be worked with all types of fruit, and the packer who masters it is soon expert in packing. Study the packing counts and see the packs that have to be packed with the open pockets, these being the only counts that may present difficulties to the beginner.



Second layer 3—2 pack. This layer starts with two tomatoes resting in the pockets of the first layer, which started with three tomatoes.



Second layer 2—2 pack. This layer starts with two tomatoes resting in the pockets of the first layer, which started with two tomatoes.

Second layer 2—1 pack. This layer starts with one tomato resting in the pocket of the first layer, which started with two tomatoes.

PLATE 97 (Fig. 7).—METHOD OF PLACING FRUIT IN SECOND LAYER.

Note how the tomatoes rest in the pockets of the previous layer.

Noticing the correct alignment of fruit when packing is a guide to the packer, faults being easily detected by observing the pack getting out of alignment. When this occurs the packer should correct the fault immediately by removing the incorrectly sized fruit.

Mistakes must be corrected as they occur, because it is impossible to finish a case perfectly if any one layer is wrong. Packing a layer with fruit too small and placing in two extra is the most common fault found with beginners. When finishing off a case packed with open pockets many packers place two extra small tomatoes in the pockets at the end of the top layer, making it hard to get the lid on and spoiling the alignment of the whole case. A case only holds a certain quantity, and placing more in the case only causes bruising or splitting.

Finished case, 3—2 pack.

Finished case, 2—2 pack.

Finished case, 2—1 pack.

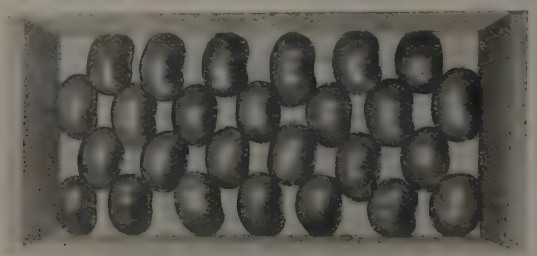
PLATE 98 (Fig. 8).—NOTE ALIGNMENT OF FRUIT IN THE CASE.

First layer.

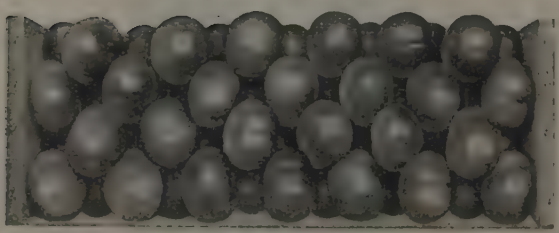
Finished case not high enough.

PLATE 99 (Fig. 9).

2½-inch tomatoes packed 2—2 with closed pockets, 8 x 8 count, 3 layers, 96 tomatoes, which is too low, but when packed with open pockets, as in Fig 10. comes to the correct height.



First layer.



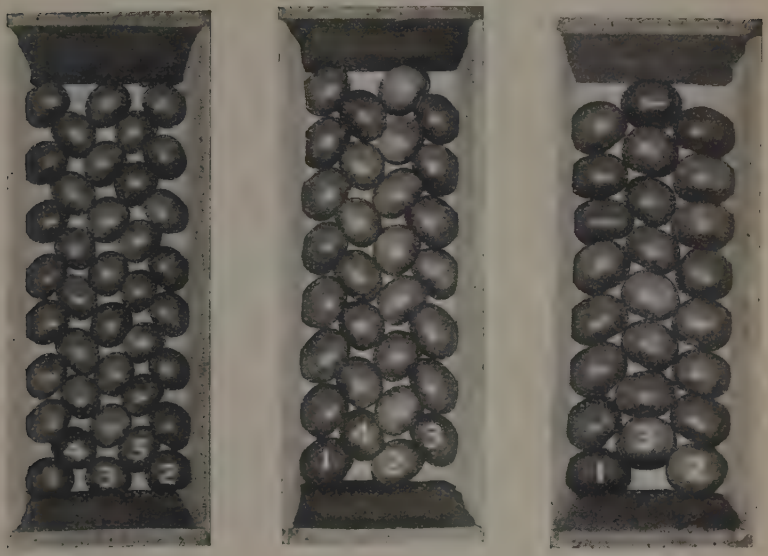
Finished case.

PLATE 100 (Fig. 10)—THE SAME FRUIT AS IN FIG. 9.

Packed 2—2, with open pockets, 7 x 6 count, 4 layers, 104 tomatoes, which comes to the correct height.

These illustrations explain the rule—"The size of the pocket governs the height of the fruit in the case."

Flat Tomatoes.



3—2 pack. 8 x 7 count, 6 layers, total 225.

2—2 pack. 8 x 7 count, 5 layers, total 150.

2—1 pack. 8 x 8 count, 4 layers, total 96.

Plate 101 (Fig 11).—First Layers Packed in Cases made on the Narrow System.

Plate 102 (Fig. 12).—Finished Packs in Cases made on the Narrow System —18 in. long, $7\frac{1}{8}$ in. wide, $8\frac{2}{3}$ in. deep.

PACKING ROUND TYPE TOMATOES.

Round type tomatoes of the "Marglobe" variety pack best in cases made on the narrow system. The system of packing is the same. Packers should compare the approximate sizes of the round and flat types of fruit in order to show the difference in the number in each case; for example, fruit of the flat type of approximate size 2½ inches in diameter count 110 to 140, compared with the round type counts of 84 to 96.

PACKS THAT BRING ROUND-TYPE TOMATOES TO THE CORRECT HEIGHT IN THE CASE.

Round Type Tomatoes.—Counts to use when packing the Half-bushel Dump Case, 18½ in. long x 7⅛ in. wide x 8⅜ in. deep.

Approximate Size.	Pack.	Layer Count.	No. of Layers.	Total.	Type of Pack.
2 in.	2—2	8—8	5	160	
	2—2	8—7	5	150	
	2—2	7—7	5	140	
	2—2	7—6	5	130	
2¼ in.	2—2	6—6	5	120	Open pockets
	2—2	6—5	5	110	
	2—1	9—8	4	102	
2½ in.	2—1	8—8	4	96	Closed pockets
	2—1	8—7	4	90	
	2—1	7—7	4	84	
2¾ in.	2—1	7—6	4	78	
	2—1	6—6	4	72	Open pockets
3 in.	2—1	6—5	4	66	
	2—1	5—5	4	60	
4 in.	2—1	6—5	3	50	Closed pockets
	2—1	5—5	3	45	

PACKING THE LONG HALF-BUSHEL CASE, 26 INCHES LONG BY 6 INCHES WIDE BY 7⅛ INCHES DEEP.

This case is not recommended before the half-bushel dump case. The same system of packing is used, the diagonal packs and counts being slightly different to the half-bushel dump case owing to the different dimensions. This case is composed of two compartments 13 inches long by 6 inches wide by 7⅛ inches deep. The packing counts given are for each compartment.

PACKING COUNTS TO USE WHEN PACKING FLAT-TYPE TOMATOES.

Long half-bushel case, 26 inches long by 6 inches wide by 7⅛ inches deep.

Approximate Size.	Pack.	Layer Count.	Number of Layers.	Total.	——
2 in.	2—2	6 x 6	5	240	
	2—2	6 x 5	5	220	
	2—2	5 x 5	5	200	Open pack
	2—1	8 x 8	4	192	
2⅛ in.	2—1	8 x 7	4	180	
2¼ in.	2—1	7 x 7	4	168	
	2—1	7 x 6	4	156	
2½ in.	2—1	6 x 6	4	144	
2⅝ in.	2—1	6 x 5	4	132	
2¾ in.	2—1	5 x 5	4	120	Open pack
	2—1	5 x 4	4	108	
3 in.	2—1	5 x 5	3	90	
	2—1	5 x 4	3	82	

Round Type Tomatoes.

It is preferable to pack tomatoes of this type in cases made on the narrow system.

2—2 Pack. 2—1 Pack.

6—6 Layer, 5 Layers, Total 120.

Finished Case. 2—2 Pack.

Side. Top.

7—6 Layer, 4 Layers, Total 78.

Finished Case. 2—1 Pack.

Top. Side.

6—6 Layer, 5 Layers, 120 Count.

7—6 Layer, 4 Layers, 78 Count.

Note the alignment of the fruit in the case.

Plate 103.

2—1 PACK, 3 LAYERS.

First Layer. Finished Case.

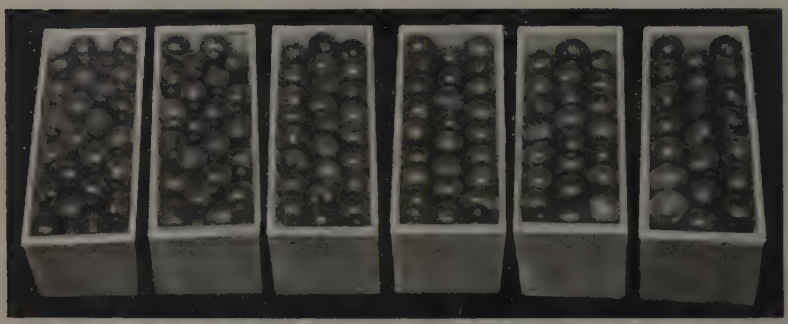
Top. Side.

2—1 Pack, 6—5 Layer, 3 Layers, 50 Count.

2—1 Pack, 6—5 Layer, 3 Layers, Total 50. Compare this 3 Layer 2—1 Pack with the 4 Layer 2—1 Pack.

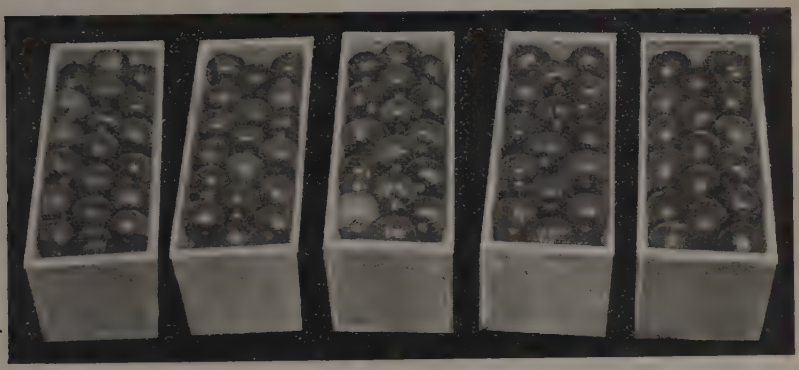
Finished cases of round-type tomatoes packed in the case made on the narrow system 18 inches long by $7\frac{1}{8}$ inches wide by $8\frac{3}{4}$ inches deep.

2—2 PACKS. 2—1 PACKS.



120 Count. 110 Count. 102 Count. 96 Count. 90 Count. 84 Count.

PLATE 104.



78 Count. 72 Count. 66 Count. 60 Count. 50 Count.

Plate 105.

Note.—Compare cases 66 count with 50 count. Both of these cases are packed 2—1 and have a 6—5 layer, the difference being that the 66 count contains four layers and 50 count three layers.

Packing Counts to Use when Packing Round-type Tomatoes.

Long half-bushel case, 26 inches long by 6 inches wide by 7⅛ inches deep.

Approximate Size.	Pack.	Layer Count.	Number of Layers.	Total.	—
2 in.	2—1	7—7	4	168	Closed packets
	2—1	7—6	4	156	
2¼ in.	2—1	6—6	4	144	
	2—1	6—5	4	132	
	2—1	5—5	4	120	Open pockets
	2—1	5—4	4	108	
2½ in.	2—1	4—4	4	96	
	2—1	5—5	3	90	Closed packets
2¾ in.	2—1	5—4	3	82	
	2—1	4—4	3	72	Open pockets
3 in.	2—1	4—3	3	64	
3½ in.	2—1	3—3	3	54	Pack with the blossom end of the fruit to the side of the case
	2—1	3—2	3	46	

It will always be wise to remember the following points in marketing:—

Good packing alone will not keep up a demand for bad fruit. Good fruit is always necessary, and good fruit well packed and attractively got up is easy to sell and will, in times of over-supply, be the first to be disposed of.

For special grade tomatoes wrapping is recommended when long distances have to be traversed. When fruit is wrapped the use of lining paper is not necessary. When unwrapped it improves the appearance of the finished case to use plain or coloured paper for lining in preference to the use of newspaper, which looks shoddy and shabby, favoured by some of the growers. A coloured label also adds distinction to the packed case, and is recommended. Good packing and get-up

followed by careful handling and loading whilst in transit to the market will give the grower the best returns for his labour. Using a packed case as a seat while carting is a very common fault with growers and carters, as is also the walking on cases while stacking in trucks. Want of thought is the reason as a rule why fruit is badly handled in these ways.

Acknowledgment.

Thanks are due to Mr. P. Bach, Pinklands, Mr. A. F. Smith, and Mr. W. Burns, Thornlands, and Arkell and Sons, Fruit Exchange, Brisbane, for making available fruit for illustrations.

Main Points to Remember.

In conclusion, the following are the main points for packers and others who handle fruit to remember:—

Don't place green and ripe fruit in the one case.

Don't place one fruit directly on top of another when packing, but keep them in the pockets of the preceding layer.

Don't stand, walk, or sit upon packed cases.

Don't pack immature green tomatoes; they will not ripen properly.

Don't pack defaced, marked, or damaged tomatoes; they reduce the value of the case.

Don't use newspaper for lining; plain paper pays.

Don't try and pack large and small tomatoes in the one case; it spoils the alignment and the appearance of the pack and helps to reduce the price of the case.

PLATE 106.—WESSEX SADDLEBACK SOW.

HOLMSLEIGH ACE (Imp.), property of R. Turpin, Kentville. Winner of First Prize, Brisbane Show, 1931 and 1932, and a representative of a breed that caught the public eye at the Brisbane Exhibition.

"Queenslander" Photo.

PLATE 107.—ON THE OPENING DAY OF THE BRISBANE SHOW.

The group includes their Excellencies the Governor-General, Sir Isaac and Lady Isaacs, their Excellencies Sir Leslie and Lady Wilson, and the Premier, Hon. W. Forgan Smith, and Mrs. Forgan Smith.

PLATE 108.—ARRIVAL OF HIS EXCELLENCY THE GOVERNOR, SIR LESLIE WILSON, AT THE BRISBANE SHOW.

PLATE 109.—BOONAH LIGHT HORSEMEN RECEIVE THEIR TROPHY FROM HIS EXCELLENCY THE GOVERNOR-GENERAL, SIR ISAAC ISAACS, AT THE BRISBANE SHOW.

PLATE 110.—ON THE LAWN AT THE BRISBANE SHOW.

The group includes Her Excellency Lady Isaacs and the Premier, Hon. W. Forgan Smith.

PLATE 111.—"THE GRASS THAT HAS CONQUERED MAN. THE GRAIN THAT IS BREAD."
This display of Queensland wheats was one of the finest features of the Departmental Court at the Brisbane Show.

PLATE 112.—THE WEALTH OF QUEENSLAND'S ORCHARD LANDS ILLUSTRATED AT THE BRISBANE SHOW.

PLATE 113.—QUEENSLAND GROWN TOBACCO AT THE BRISBANE SHOW.

In 1930-31 there were 382 acres under tobacco in this State, yielding 260,670 lb. of cured leaf. This year's production is approximately 2,750,000 lb. of cured leaf from 4,800 acres. This comprehensive display of leaf from Queensland's wide tobacco lands was definite proof that the State can supply a high quality product acceptable to both manufacturer and smoker.

PLATE 114.—PRODUCTS OF QUEENSLAND'S GREAT GRAIN LANDS.

This fine display at the Brisbane Show told an impressive story of the development of maize breeding and production in Queensland. It also demonstrated the success of Departmental plant breeders in the evolution and fixation of types that have quadrupled our grain yield. Maize growing is now one of Queensland's major agricultural industries.

Plate 115.—Our Wealth in Wool Fitly Illustrated at the Brisbane Show.
Exhibit arranged by Mr. W. G. Brown, formerly Instructor in Sheep and Wool, Department of Agriculture and Stock.

PLATE 116.—A WHITE MAN'S INDUSTRY IN A WHITE MAN'S LAND.

The cane alcove in the Court of the Department of Agriculture and Stock was an attractive and effective representation at the Brisbane Show of an industry carried on successfully by white Australian farmers and workers in field and factory, and which is worth approximately £10,000,000 a year to the Commonwealth.

PLATE 117.—SCIENCE IN RURAL INDUSTRY.

This exhibit was one of several striking illustrations at the Brisbane Show of the extent and value of the scientific services available to farmers through the Department of Agriculture and Stock.

PLATE 118.—THE CENTRAL TROPHY IN THE AGRICULTURAL COURT.
A story of Departmental effort and success told in sheaf, grain, and valuable derivatives at the Brisbane Show.

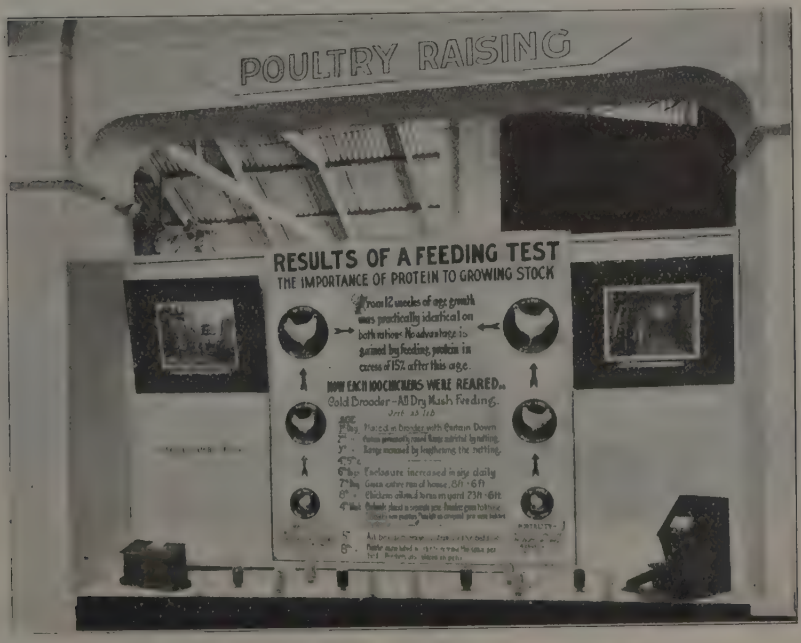


PLATE 119.—POULTRY PANEL IN THE COURT OF AGRICULTURE AT THE BRISBANE SHOW.

PLATE 120.—EXHIBIT FROM THE STATE ANIMAL HEALTH STATION.

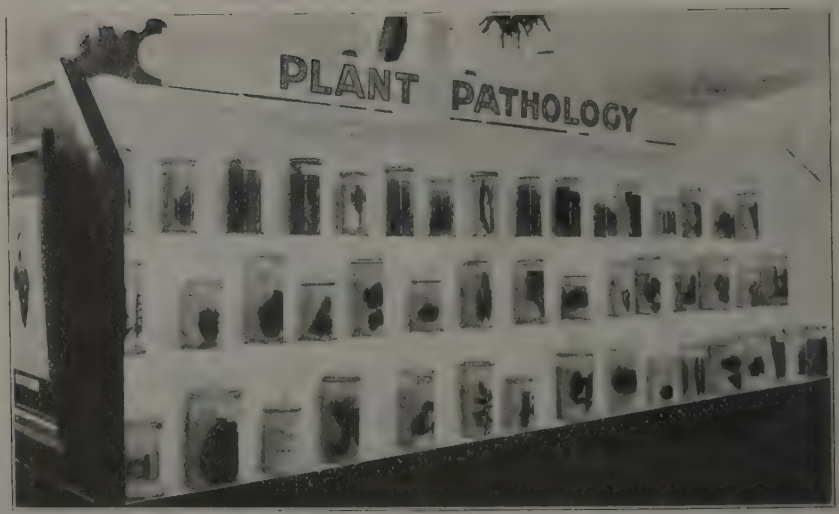


PLATE 121.

THIS PANEL IN THE AGRICULTURAL COURT ILLUSTRATED THE VALUE OF THE SCIENTISTS' SERVICE TO THE FARMER.

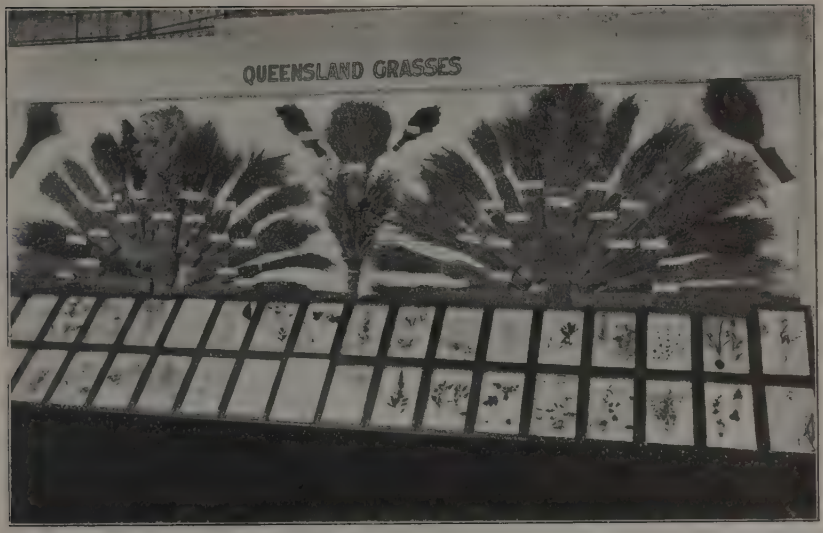


Plate 122.—"All Flesh is Grass."

These samples of Queensland's pastures panelled in the Agricultural Court at the Brisbane Show illustrated a wide range of nutritious indigenous grasses and herbs from which is derived a vast proportion of our natural wealth.

Plate 123.—Milk for the Multitude.

Dairying in Queensland has developed into an industry of first importance. One-fourth of the aggregate butter output of the Commonwealth, and almost half the cheese out-turn are produced from Queensland pastures. The annual value of the industry is approximately £7,000,000.

PLATE 124.—THE JOURNAL AT THE SHOW.

The "Q.A.J." Information Bureau, established in the Agricultural Court at Brisbane Show, was the distributing centre of useful information on Departmental activities. Mr. Eric Keehn is the young officer in charge.

PLATE 125.—THE PIG PANEL IN THE AGRICULTURAL COURT.

Pig raising is a well-established Queensland industry. Throughout the year an active educational campaign is carried on by the Department of Agriculture and Stock, and this exhibit illustrated the effectiveness of that work.

THE MAIZE INDUSTRY IN QUEENSLAND.

By C. J. McKEON, Instructor in Agriculture.*

Mr. McKeon has for many years been associated with plant breeding in Queensland, and especially with the improvement of maize varieties, as directed by the Department of Agriculture and Stock.

At this year's Royal National Exhibition at Brisbane many excellent examples of the results obtained through this important work were displayed and attracted much attention from growers and seedsmen. Mr. McKeon's observations are a welcome contribution to current literature on the subject.—Ed.

MAIZE is the world's most extensively grown cereal, the average annual yield for the five years ending 1913 being 4,119,000,000 bushels, whilst the average production for a similar period ending 1929 was 4,445,540,000 bushels, a very considerable increase. Approximately 75 per cent. of this quantity was produced in the United States of America.

By way of comparison, the world's average annual production of wheat is 4,319,659,000 bushels. Irrespective of the position as exists in Australia from these figures it is quite apparent that, from the world's standpoint, the diminishing demand for horse feed, brought about by the use of motor power and transport, has not had the effect of decreasing the production of maize, in fact the figures previously quoted show an increase, which goes to prove that new uses have been found for the grain.

Food Value of Maize.

The value of maize for feeding to stock on the farm, also as a human food, is appreciated more in America probably than in any other country. Out of the enormous annual yield of approximately 3,000,000,000 bushels in the United States about 85 per cent. is fed to stock, 10 per cent. is used for human consumption, and only about 1½ per cent. is exported.

The average yield per acre in Australia compares very favourably with that of the other chief maize-producing countries. Taken over a five-year period, 1926-1930, this was slightly over 26 bushels compared with 27 bushels in America, and an average yield per acre for the whole world of, approximately, 23 bushels.

The maximum area under maize in Australia was during the 1910-1911 season, when 414,914 acres were sown and a record crop of over 13,000,000 bushels resulted. These figures were approached during the 1924-25 season when the Commonwealth yield was just under 12,500,000 bushels, due mainly to a record yield in Queensland of 7,733,000 bushels.

In the past one of the principal uses for maize was as horse feed. Owing, however, to the increased use of motor power generally throughout the Commonwealth, and the corresponding decrease in horse power, the demand for maize for horse feed is becoming smaller each year, and it is essential in the interests of the industry that other economic methods of utilisation should be found.

Queensland's Chief Cereal.

Maize is Queensland's chief cereal, over 50 per cent. of the total crop for the Commonwealth being produced in this State. The crop is worth approximately £1,000,000 a year to the State; that for the 1924-25 season was worth nearly one and a-half millions. As maize in Queensland is usually grown in comparatively small areas, the resultant high cost of production is the principal factor against depending upon an export trade, while the distance from the overseas markets is also a big handicap. Before attempting to build up an export trade, our own Australian markets could be greatly developed. Much could be done to further popularise maize as a stock food, and if the same percentage of Australia's crop were used for this purpose, as is being done in America, maize-growers would have little to fear regarding overproduction. As an illustration of what effect this would have, and using the record Commonwealth yield of 13,000,000 bushels as an

* In a series of radio lectures from 4QG.

example, 85 per cent. of which would mean 11,000,000 bushels, if this quantity or anything approaching it were used for stock food the balance would be quite inadequate to meet Australia's requirements and would necessitate increased production. Its value as a human food is being appreciated more each year, this being proved by the greatly increasing demand for maize for this purpose, the annual requirements of some secondary enterprises now being in excess of 1,000,000 bushels.

The average number of dairy cows in Queensland is 666,500, and the number of pigs averages about 209,000. Allowing that each animal consumed only 3 bushels in the course of the year, equal to under 2 lb. weight a day for less than three months of the year, it would mean an annual consumption of 2,626,500 bushels, equal to 52 per cent. of the State's average crop of 5,042,600 bushels. The value of maize meal as a food for dairy cattle in the colder months of the year when natural supplies of food are either scarce or possess little food value, is not by any means fully appreciated by dairymen in this State. Those, however, who have tried it soon became convinced of its value.

Apart from its high food value, being a carbohydrate, it helps to maintain warmth in the body, which is of great assistance to cows in cold districts in keeping up the milk supply. Butter prices are almost invariably higher during the winter months and the increase in production readily pays for the maize used and for the little extra time occupied in feeding.

A Popular Ration for Pigs.

Maize has long been a popular pig food and its value for this purpose was fully demonstrated in the feeding trials conducted recently at Yeerongpilly to demonstrate the comparative feeding values of maize, wheat, and barley when used in balanced rations.

It was stated in the report that the maize-fed pigs grew faster and required less food by weight to produce a given quaitity of pork than those fed on wheat and barley. In fact, they did so well that when marketed along with the wheat and barley-fed pigs they were slightly past prime condition. The quality of the bacon was equally as good as that from the pigs fed on the other grains and was very favourably commented on by the grader and curer at the bacon factory. Results equally as good were obtained in a poultry-feeding experiment at Mount Gravatt recently. In a ration where maize exceeded 50 per cent. Australorp cockerels were produced which weighed at eighteen weeks of age more than 5¼ lb. At twenty-four weeks the average weight of all males in the test was approximately 7 lb.

Range of Cultivation.

Vast areas in Queensland are suitable for maize-growing and were the industry to warrant it, considerable expansion could take place. It is grown extensively along the coastal area from the Tweed to Rockhampton and inland within the 30-inch rainfall belt.

The Moreton, Wide Bay and Burnett, and Darling Downs districts among them usually produce over 80 per cent. of the State's crop, the next district of importance being the Atherton Tableland which, due to the comparatively safe rainfall, has much the highest yield per acre of any district.

With the exception of districts such as the Atherton Tableland, where the reliable rainfall practically assures a crop, in fact loss is more often occasioned through excessive rain than from drought, maize-growing is chiefly carried out in conjunction with some other form of farming. Where it is depended upon as a sole means of livelihood large areas are necessary to show a payable return, for when prices are taken over a number of years it will be found that the margin of profit is small. It can be grown more profitably in conjunction with other forms of farming, particularly dairying and pig raising, two industries which are associated almost invariably. When grown in this way it is very rarely a dead loss, except of course in exceptional circumstances such as floods and other disastrous visitations. Should the crop become a failure through dry weather setting in during the tasselling period, it can be used either as a green fodder for dairy stock or for converting into silage.

Frequently maize will make excellent growth up to the tasselling stage, but may not produce a payable crop owing to hot dry winds prevailing at this period. For converting into silage it is one of the most suitable and widely used crops.

Growers' Organisation.

Several attempts have been made in recent years to organise the maize-growers throughout the State, but on each occasion the requisite number of growers did not vote in favour of a pool. Growers as a whole would certainly benefit by some form of organised marketing as they would then be able to enter into contracts which would not be possible under present conditions. As a result of organised marketing the Atherton Maize Board was able to enter into a five-year contract with a Melbourne firm to supply 240,000 bushels annually at 4s. per bushel f.o.b. Cairns. Another Southern manufacturer requires large quantities of maize of one special type, but growers could only enter into a contract such as this when efficiently and adequately organised, for production as well as for marketing. It might also be possible to enter into some arrangement with graziers to supply them with maize at a price which would be satisfactory to both grower and purchaser for storage on stations as a standby for stock food, in times of drought. Sheep owners in the past have had to purchase huge quantities for this purpose at a high price, and as the difference between the price of maize during drought periods and that at which it can be purchased during normal seasons is considerable and would more than pay for the cost of storage something could certainly be done in this direction to the advantage of both farmer and grazier.

THE SELECTION OF SEED MAIZE.

THE importance of careful seed selection cannot be too strongly stressed and maize-growers who practice this are more than compensated for the little extra work which it entails.

It is becoming more evident each year that a large number of Queensland maize-growers appreciate this fact, and that they either carefully select their seed requirements from their own crops, or obtain them from some reliable source. This is borne out by the number and excellence of exhibits displayed at Brisbane and country shows.

Growers who have not a pure strain of a high-yielding variety known to be suited to their particular locality and who are desirous of having them, should be sure that they are getting their seed from a reliable source, otherwise the resultant crops will probably prove to them that the crop from which the seed was selected was grown in close proximity to a different, and probably mixed variety, and that cross fertilization has occurred.

As maize cross-fertilizes very readily, the pollen being borne for a considerable distance by wind and insects, difficulty is frequently experienced in closely settled districts in keeping maize varieties pure.

Cross fertilization can only occur when both crops tassel at the same time and a difference of a few weeks between the plantings is sufficient to prevent this. As this, however, is not always possible owing to advantage having to be taken of suitable rains, in the event of a neighbouring crop tasselling at the same time, the selection should be confined to that portion of the crop which is furthest from the other crop and if possible away from the direction from which the prevailing winds blow.

Selection should be carried out in the field and should be done before the plants are thoroughly dry, so as to be able to distinguish between the early and late maturing plants.

By continually selecting as nearly as possible only ears of even ripeness, the crop will tassel evenly and better fertilization, and consequently well filled ears, will result.

Late maturing plants will naturally tassel later than the balance of the crop and the supply of pollen is then limited; the plants frequently having to depend entirely on their own supply of pollen, and the ears are frequently very poorly filled. In selecting for early maturity, care must be taken to see that the plants have ripened naturally and that ripening has not been hastened by disease or any injury. A common cause of forced ripening is the maize grub, and it will frequently be found on examination, that the grub has bored into the shank and caused the ear to ripen prematurely.

Selections should be made only from strong healthy plants with a good root system and from those which are growing in an average stand and not in an isolated or favoured position. A good root system is very important, for a plant with a

poorly developed root system cannot withstand drought; it is more easily blown down by the wind, and there is also the possibility of the poor development being due to disease.

The height of the ears on the plant is another very important point to be considered. They should be borne at, or slightly below the middle of the plant, for where they are borne high up on the stalk, harvesting is rendered more difficult and the plants will lodge much more readily during wind storms.

Ears with a shank of medium length and thickness which turn down during ripening should be selected in preference to those with a short, thick shank which remains erect. An ear when turned down will shed water more readily and is also less liable to become damaged by birds and insects than those which remain in an upright position, providing of course the husk covering extends well over the tip of the ear.

A good husk covering is very necessary, for it will almost invariably be found that an ear which has the tip protruding is more or less damaged by water or insect attack.

Regarding the number of ears to the plant, it is advisable to select from the plants which bear one good ear and at the most two, providing one of them is of standard size. Otherwise it will be found that the tendency will be to produce several small ears, with the result that the quality of the grain is affected and the cost of harvesting is increased. The points already discussed will show how necessary it is to carry out the seed selection in the field, if a grower wishes to improve the variety and at the same time retain the desirable characteristics which the variety possesses.

Where this is not practised and the selection work is left until the crop has been picked it will be impossible to tell under what conditions the ears were produced, and many which are produced under most favourable conditions will be selected in preference to others which are only slightly smaller, but which were produced under average or probably adverse conditions. Naturally, those produced under average or adverse conditions would be of much greater value for seed purposes than those produced under favoured conditions.

It is advisable to always select considerably more ears in the field than will actually by required for seed purposes. The final selection should be made in the barn and the ears selected should be of good size, without being coarse, and should also be of uniform type, shape, and colour. They should be cylindrical in shape, except in the case of a few varieties which produce a slightly tapering ear, and should be well filled up to the tip.

The types of dents vary, a few varieties having a "smooth" or "dimple" dent, but the majority of the most popular varieties now grown in this State have a "crease" to a "medium rough" dent. Grain with a "pinch" dent should be avoided, and, although it is usually of good depth, it is almost invariably light and of a soft starchy nature and will never command the price that plump, well-filled maize will. The shape of the grain varies according to the variety; those which produce ears with less than fourteen rows, such as Golden Beauty and Hawkesbury Champion or Golden King, have a slightly round shouldered, broad grain of medium depth. Those which produce ears with fourteen rows and upwards should have square shouldered, tightly packed grain with only a very small space between the rows. The grain should be firmly attached and should show little or no movement when pressed with the points of the fingers. Ears with coarse, sappy piths or cores should not be selected, as they dry out slowly and generally show a lower shelling percentage than those with a medium-sized core.

Uniformity in breadth and shape of grain is a very important point, and is one which should be strictly adhered to if the variety type is to be preserved.

The colour of grain differs according to variety. Some of the yellow varieties having a bright amber-coloured grain with a rich yellow cap, and others a pale, amber-coloured grain with a light cream-coloured cap.

Whatever colour is being selected, uniformity should be practised and on no account should an ear of a yellow variety, for instance, be selected which shows reddish or white grains. The straightness and evenness of the rows, while being desirable features, are less important than those already discussed, and as long as they are reasonably straight and even and the ears are otherwise desirable they need not be discarded.

The ears should be topped and tailed before shelling, not that the round grains from the tips and butts would not germinate, but because it is impossible to get an even sowing with a planter with seed that lacks uniformity in shape and size.

Before the seed is stored it should be thoroughly dry and quite free from injurious insects.

The quantity of seed maize required for the average farm is not large, and it is quite a simple matter to store the grain and keep it in good condition for the following season's planting. All that is necessary is an air-tight container, such as a carbide drum, and, after making certain that the grain is thoroughly dry, it can be placed in this with a small quantity of flaked napthalene mixed well through it and the lid sealed down. The napthalene will destroy any moth or insects which may hatch after the grain is placed in the container, and will not affect the germination.

MAIZE VARIETIES AND THEIR SUITABILITY FOR DIFFERENT DISTRICTS.

ALTHOUGH this species has been classified into several different sub-species, it is intended to deal only with those which are grown on a commercial scale in Queensland.

Dent Maize.

As far as Queensland is concerned the Dent varieties, which include Yellow, White, and Red are of much the greatest importance. Quite a number of growers, however, do not appear to be aware that there are very many different varieties and strains of Dents, particularly Yellow Dents, grown in different parts of the world and, as a matter of fact, the bulk of the maize grown in Southern Queensland is a Dent of some variety.

The grain of these varieties has a characteristic dent in the crown when mature, this being due to the shrinkage of the soft starch when drying. The soft starch extends from the germ to the top of the grain and lies between two sections of horny endosperm on either side.

Flint Maize.

This, as the name implies, is a hard type of maize and contains a much higher percentage of horny endosperm than the Dent varieties. The soft starch does not, as in the case of the Dents, extend to the top of the grain, but is entirely surrounded by the horny endosperm.

The grains carry only a very slight, and in many cases no indentation whatever. In Southern Queensland, where the high yielding Dent varieties can be grown so successfully, the Flint varieties are not commonly grown. They are more suitable for districts which experience a heavy rainfall, particularly during that period of the year when the crop is ripening. Under conditions such as these, the Flint types have proved to be much more resistant to Diplodia, and other fungus diseases, and give much more satisfactory results than the softer and more starchy Dent varieties.

Flour Maize.

This is a very soft, floury type of maize and contains no horny starch whatever. The grains like those of the Flint varieties are somewhat rounded and show only a very slight indentation.

Maize of this class is not grown to any extent in Queensland for commercial purposes, its softness rendering it very subject to weevil attack and, in addition, it is not a heavy cropper. It, however, makes an excellent meal for stock feeding purposes and a limited area is sown with the Brazilian white variety each season for this purpose.

Those already mentioned, i.e., Dent maize, Flint maize, and Flour maize are almost entirely the only kinds now grown in Queensland, and, although Sweet Corn and Pop Corn have been grown, and very successfully too, there is not sufficient demand for either of these to warrant their production. Both are largely grown in the United States of America, Sweet Corn for culinary purposes and Pop Corn for confectionery purposes.

Practically every variety of maize shows a great variability in type, due to the fact that, unlike wheat which is naturally self-fertilized, it is not naturally self-fertilized and anyone who has been in a field of maize during the tasselling period and has seen the cloud of pollen which is carried throughout the field by wind can readily understand the amount of cross-fertilization which takes place. The constant crossing of the different genetic types causes this variability and consequently the same uniformity of type is not found, even in varieties which have been kept absolutely pure and have been carefully selected for very many years, as is found in other grains which are self-fertilized.

Environment also has an effect on type. Quite frequently the type of a particular variety is also changed through a grower having a fancy for a certain type and selecting closely to this type each season.

From what has already been said, it will be seen that even the best and most carefully selected varieties will show at least some variation in type, and in giving a description of any variety the type which occurs with the greatest frequency is that which is used as a standard.

It will also be readily seen how quickly any variety could become mongrelised, particularly in closely settled districts, through being grown in close proximity to another variety. This unfortunately is occurring frequently, and large areas are being sown annually with maize which bears little or no resemblance to the variety by which it is called.

This point was stressed in a previous talk, but it is of such importance that it is considered worth stressing again and growers cannot be too strongly advised to secure their seed, whenever possible, from some reliable source.

As maize is grown over such a wide area of the State, there is naturally a very large number of varieties and so-called varieties in use. The poor yielding and otherwise unsuitable varieties are, fortunately, fast disappearing, and one only has to see the excellent quality and trueness to variety type of the grain exhibited at the different agricultural shows to realise that most growers are now going in for not only the better varieties, but also for those varieties which are the most suitable for their particular district. For a number of years the Department of Agriculture and Stock has been carrying out seed maize improvement work on a large scale, and during that period a large number of different varieties have been tried. Only the best of these have been retained and as a result of the work of Departmental officers a considerable improvement in both type and yield has been effected in these varieties.

The popularity of these strains is evidenced by the large number of applications which are received for seed each year, and, although sufficient selected seed to sow some thousands of acres is distributed annually by the Department, the supply is never equal to the demand. The demand for seed was greater than ever this season, and the supplies of all varieties are now exhausted.

The varieties which will now be briefly described are those which are recommended by the Department:—

Funk's 90 Day.

This variety was introduced from America by the Department some years ago, and is now extremely popular with growers. It is an early maturing, fairly short growing variety and for a quick-maturing variety is a very heavy yielder. The cars are of fair size and carry usually from sixteen to twenty rows of very closely packed grain. The grain is plump, of good depth, and slightly pointed, with an amber-coloured base and a rich yellow cap and crease to a slightly rough dent. This variety is highly recommended for early crops, or for districts which have a short growing season. Yields of up to 100 bushels an acre have been obtained under field conditions from Departmental propagation plots.

Star Leaming.

This is a medium early variety and takes approximately four months to mature. It is without a doubt one of the best all round varieties grown in Queensland. For a fairly quick maturing variety the cars are large, slightly tapered, and carry from sixteen to twenty rows of very closely packed grain. They are particularly

well covered, are borne low on the stem and turn down during ripening. The grain is slightly larger than that of the 90 Day, and is also of a brighter amber colour. It is a very suitable variety for early, or catch crops, and has proved to be suitable for any district, particularly the more inland regions which have not a heavy rainfall. Yields of 90 bushels have frequently been obtained. It is also an excellent fodder corn.

Reid's Yellow Dent.

This is a moderately tall-growing variety which takes much the same time to mature as Star Leaming. The ears are cylindrical in shape, of good size, and usually carry from sixteen to twenty rows of very tightly packed grain. It is of a pale amber colour at the base, with a creamy-coloured cap and a rough crease dent. The stalks are light and leafy and make excellent fodder. Like Star Leaming, this is a very suitable variety for early cropping and for districts which have a short growing season. This is an exceptionally heavy yielder, and yields of over 100 bushels have been obtained.

Funk's Yellow Dent.

With this variety the growing period, and many of the habits of growth, are very similar to Reid's Yellow Dent. The grain is also very similar in appearance, the only difference being that it is somewhat squarer on the crown and has not as rough a dent. This is also a very good variety for early sowing, but is not quite as heavy a cropper as Reid's.

Golden Beauty.

This is a fairly tall growing, medium late variety, taking approximately four and a-half to five months to mature. The ears are long with a very light core, and usually carry twelve rows of grain. Husk covering is particularly good and the ears turn down very well when ripening. The grain is not so deep, but much broader than that of the varieties already discussed. It is a bright amber in colour with a cream-coloured cap and a long crease dent. This is an excellent yielder, and is a very hardy variety, and will stand up to dry conditions much better than most varieties. The grain when shelled makes a particularly attractive sample and will always command top price on the markets.

Improved Yellow Dent.

This variety is now also known as Fitzroy, which has caused considerable confusion and many growers are purchasing seed thinking they are getting some new variety. It is a late-maturing variety, taking approximately five and a-half months to mature, and is without a doubt the heaviest cropper of any variety grown in Queensland to-day. The ears are large and cylindrical in shape, with usually sixteen to eighteen rows of grain. The grain is deep and wedge-shaped, of a rich amber colour, with a bright yellow cap and a rough crease dent. Husk covering is very good. For coastal districts and jungle or rain forest lands, where there is a good rainfall, this is without a doubt the best of the late-maturing varieties. A yield of 117 bushels an acre was obtained from an 8-acre Departmental propogation plot in the Imbil district.

Of the white varieties, Boone County, White, and Silvermine have given the best all-round results. Both are good croppers and produce fairly large ears carrying a deep grain with a rough to a slightly pinched dent. They are also fairly hardy varieties and are excellent fodder corns.

Regarding red varieties, the growing of these has been discontinued by the Department mainly owing to the fact that red grain will not now be accepted for export purposes.

The yellow varieties already discussed have also proved to be equally as good and in some cases better than the best of the red varieties, and it would therefore be unwise to encourage the production of a class of grain which could not be exported.

COLOURING MATURE CITRUS FRUITS.

ACETYLENE GAS TREATMENT.

By R. L. PREST, Instructor in Fruit Culture.

IN recent years citrus growers have realised the value of marketing their fruit showing a normal ripe colour having clean and unblemished skins.

Certain varieties of oranges and mandarins are satisfactory and desirable food although still green in colour. When left on the tree to become fully coloured their eating quality deteriorates. In some districts the adverse weather conditions experienced later in the season frequently results in skin blemished and scalded fruit, which, if not a total loss, are greatly reduced in market value.

High grade lemons should always be picked green on reaching their normal size and maturity.

The green colour suggests immaturity and is against the satisfactorily marketing of the fruit. During recent years it has been found that the introduction of certain gases, such as carbon monoxide, acetylene, and ethylene, during the sweating process, accelerates the colouring of mature citrus fruits. Again this should be of assistance to orderly marketing if inter-district co-operation was practised more fully.

To colour satisfactorily the fruit should have reached a certain degree of maturity, if too green and immature it will not develop its normal colour. All citrus fruits must now pass the State and Federal maturity standard, thus safeguarding the public from the sale of immature fruit whether green or coloured. The value of colouring to the citrus industry must therefore be patent to every commercial grower.

Careful Handling Essential.

All fruits to be coloured require additional care in their handling. Bruises show up as greenish areas, oil liberated from the rind may cause spotting. If oil or bordeaux sprays remain on the fruit it will be found that it will come from the colouring room spotted and unsightly.

Any ordinary room lined with timber can be used providing it is air-tight. Where colouring is to be practised on a commercial scale, a chamber having double walls insulated with sawdust, fitted with an air-tight door and draught port on the opposite wall should be constructed. A convenient and economical size would be one to hold 40 to 50 bushel cases, allowing 5 cubic feet of air space to each bushel case, the chamber would require to be of from 200 to 250 cubic feet capacity. Where larger numbers of cases are to be treated it will be found more satisfactory to build two medium-sized rooms in preference to one large one.

For oranges, lemons, and mandarins an average temperature of between 65 and 75 degrees Fahrenheit will prove satisfactory. If the temperature falls below 65 degrees the process will be retarded. The fruit is not likely to be affected by high normal temperatures, up to 89 degrees has shown no ill effect. However, the humidity will require adjusting; in the case of a very dry atmosphere an open vessel of water may be introduced to prevent withering. Where the humidity is high and likely to cause softening, it may be reduced by placing sand, caustic soda, or quicklime on the floor of the chamber.

Method and Equipment.

Fruit to be coloured should be graded for colour and loosely packed into open cases having plenty of ventilation. Dunnage should be used in stacking in order to have an air space round each case.

In a suitable container place the required quantity of carbide.

A second vessel containing water should be arranged in such a manner as to permit the water to slowly drip on to the carbide to generate the acetylene gas.

This apparatus may be fitted either inside or outside the chamber, if the latter, the gas will have to be led into the chamber by means of suitable piping.

Close the chamber, making sure that it is air-tight, allowing it to remain closed for four hours.

Open up the chamber and thoroughly air it for at least two hours.

Between nine and fifteen charges should be sufficient to give mature citrus fruits their normal colour.

It was found that a very small quantity of acetylene gas, 1 part in 2,500 to 1 part in 1,875, satisfactorily coloured matured citrus. To determine the dosage the air space remaining after the chamber has been loaded must be known.

One ounce of carbide generates sufficient gas for every 75 cubic feet of air space.

For practical purposes allow 1¼ cubic feet displacement for each bushel case of fruit.

For example the following table illustrates the dosage required for a chamber of 200 cubic feet capacity with varying numbers of cases.

Size of Chamber.	Number of Bushel Cases.	Air Space.	Dosages.
200 cubic feet	40	150 cubic feet ..	2 oz. of carbide
200 cubic feet	20	175 cubic feet ..	2¼ oz. of carbide
200 cubic feet	10	187½ cubic feet ..	2½ oz. of carbide

The above treatment does not in any way improve the sugar contents or the eating quality of the fruit. It does, however, improve the carrying quality of the fruit, the skin being of a much finer and tougher quality.

The average cost of the colouring by means of acetylene gas works out at about one-seventh of a penny per case. This does not include the cost of the erection of the chamber.

AUGUST TOBACCO SALES.

DALGETY and Company, Limited, Brisbane, report having held their third auction sale of tobacco leaf at the Wool Exchange on 25th August, when they submitted a catalogue of approximately 70 tons of leaf drawn from all the principal growing districts of the State.

Growers' parcels were received from Mareeba, Dimbulah, Bowen, Sarina, Woodstock, Bilwon, Hervey's Range, and other consignments were forthcoming from Texas, Inglewood, Yelarbon, and Killarney.

Competition for Northern leaf was keen and prices realised compared most favourably with the last sale, the prices obtained being considered highly sastisfactory. The average price realised for the 60 per cent. of the offering disposed of was a fraction under 30d. per lb., a really good average considering the various grades and qualities that were offered. The unsold lots comprised immature leaf or leaf that had been over-conditioned, mainly the former.

Offerings from the North at this sale were not quite equal in quality to those of last month, but on the whole the leaf was quite in keeping with what is grown in those parts. The top price secured was for a line of Mareeba leaf, 48d., and Elphinstone and Kirby Ltd., Bowen, had another very satisfactory price, their top price being 47d. The latter growers have placed Bowen on the map as a tobacco-growing district, and it has been established now beyond all doubt that this district can grow leaf equal in quality to the best; this is evidenced by the strong competition this leaf brings at every sale.

The B.A.T. Company were again the principal buyers, bidding freely for all suitable leaf, but would not compete for anything that showed signs of immaturity.

The inquiry for Southern Queensland offerings was very limited and the bulk of the withdrawals came from this section of the catalogue.

We once again desire to warn growers against consigning immature leaf to Brisbane. The tendency of some is to forward consignments to Brisbane for sale, knowing full well that they are unable to dispose of same locally, in the hope that buyers can be found here; this is a false idea because immature leaf is not saleable.

Growers in consigning such leaf to market are acting entirely against their own interests by incurring the unnecessary expense of freight and other charges, as in most cases it will be found necessary to return the leaf.

The following are some of the principal realisations:—

Account L. Strachan, Chewko—1st and 2nd graded, 40d.; account F. C. Crappa, Bilwon—1st graded, 36d.; account Olufson Bros., Woodstock—mixed graded, 38d.; account G. B. Chandler, Major's Creek—mixed graded, 40d.; account Mitchell and Bagge, Dimbulah—1st and 2nd graded, 40d.; account G. Elias, Woodstock—1st and 2nd graded, 41d.; account W. T. Beesley, Chewko—1st graded, 40d.; account A. W. Roger, Bilwon—1st graded, 36d.; account Keith Power, Park Ridge—1st and 2nd graded, 42d.; account Bonomi and Andiloni, Woodstock—1st and 2nd graded, 40d.; account Reid and Pannell, Sarina—1st and 2nd graded, 44d.; account D. Brown, Woodstock—1st and 2nd graded, 41d.; account M. Breen, Mackay—2nd graded, 41d.; account S. Drovandi, Biboohra—1st and 2nd graded, 40d.; account B. F. McDougall, Dimbulah—1st graded, 39d.; account Wakely Bros. and Tobin, Millaa Millaa—1st graded, 46d., 2nd graded, 42d.; account W. F. Beatty, Sarina—2nd graded, 40d.; account Vaughan and Hyatt, Koumala—1st graded, 40d.; account Teitzel and Davey, Bowen—1st and 2nd graded, 40d., 2nd graded, 39d.; account Mrs. D. A. Voice, Sarina—1st and 2nd graded, 42d.; account A. Villata, Woodstock—1st and 2nd graded, 40d., 2nd graded, 39d.; account P. Canavan, Woodstock—1st and 2nd graded, 42d., 2nd graded, 41d.; account Mareeba District Hospital, Mareeba—1st graded, 48d.; account Neirotti and Cecchi, Woodstock—1st and 2nd graded, 42d., 2nd graded, 40d.; account N. G. Weik, Tamworth, N.S.W.—1st graded, 42d.; account G. Foster, Hervey's Range—1st graded, 40d., 2nd and 3rd graded, 39d.; account A. Albeitz, Bowen—1st graded, 40d.; account Andreatta Bros., Woodstock—1st and 2nd graded, 41d., 2nd graded, 41d.; account J. Peseo, Woodstock—1st and 2nd graded, 41d., 2nd graded, 40d.; account W. Lynch, Bowen—1st and 2nd graded, 45d., 3rd graded, 42d.; account J. S. Petersen, Sarina—1st graded, 45d.; account F. P. Murray, Sarina—1st graded, 42d.; account J. Mellon, Bowen—1st graded, 42d.; account H. A. Bojack, Home Hill—1st and 3rd graded, 40d., 2nd graded, 44d.; account T. Hughes, junr., Sarina—1st graded, 42d.; account Petersen, Son, and Strid, Sarina—1st special graded, 48d., 1st graded, 40d.; account J. P. Jackson, Sarina—1st graded, 42d.; account Eller and Tasane, Sarina—1st and 2nd graded, 44d., 2nd graded, 43d.; account Elphinstone and Kirby, Ltd., Bowen—1st and 2nd graded, 47d., 3rd graded, 45d.

WHEAT BOARD ELECTION.

The result of the voting conducted at the Department of Agriculture and Stock in connection with the election of five growers' representatives on the State Wheat Board was as follows:—

DISTRICT No. 1 (DALBY-MARANOA).

Ernest Ambrose Thomas (Hunterton, via Roma)	175
*Aaron Hoskin (Jimbour)	166

DISTRICT No. 2 (PITTSWORTH).

*Thomas William McIntyre (Yarranlea)	493
Arthur Carl Krieg (Brookstead)	453

DISTRICT No. 3 (WARWICK-KILLARNEY).

*Bergittinus C. C. Kirkegaard (Freestone)	356
Herbert George Hughes (Tannymorel)	160
Alexander Nicholas Allen (Campbell's Plains)	42

DISTRICT No. 4 (ALLORA-CLIFTON).

*John Edward Nussey (Allora)	358
John Edwin Maher (Allora)	169

DISTRICT No. 5 (TOOWOOMBA).

*Wilfred John Brimblecombe (Kingsthorpe)—Returned unopposed.

* Present member.

One candidate is to be elected for each district, and their term of office is for one year.

HINTS TO CANEGROWERS.

Mr. Edmund Jarvis, Entomologist at Meringa, near Cairns, has submitted the following entomological advice for September to the Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby:—

Hints on Grub Fumigation.

During this month, many growers will be considering whether to fumigate their cane grubs, several, indeed, having placed their orders for the purchase of fumigants early in August. It has now been amply demonstrated by practical field work that in the event of soil conditions being suitable for such fumigation, success can be obtained with either carbon bisulphide or paradichlor. During each season a period usually occurs in which the soil is in an aerated condition (known as "open"), when excess of moisture has drained away from the inter-spaces between the soil particles, thus allowing more air to fill these inter-spaces and penetrate to the bottom of the cultivated soil. These favourable conditions generally happen at a time when grubs are in the second and third stages of development, and include in their ranks those which may have resulted from secondary emergences of greyback beetles. Act promptly at such times.

Should the price of paradichlorbenzene become practically prohibitive, farmers would do well to use carbon bisulphide, the cost of which is about £2 per drum containing 60 lb.

The Beetle Borer Starts Work.

As the season advances, giving place to milder temperatures, the activities of our weevil borer of cane gradually become more noticeable. Crops situated on low-lying land should now be inspected, and evidence of attacks by this pest to basal portions of sticks reported to the Entomologist at Meringa without delay.

Be Prepared to Fight Cane Insects.

Supplies should now be procured of the following insecticides, which will keep from year to year without perishing, and be on the spot in case of an emergency:—

Arsenate of Lead.—This preparation can be obtained in 7-lb. tins at 1s. 6d. per lb.; 56-lb. cases at 1s. 3d. per lb.; and 112-lb. cases at 1s. 1½d. per lb. These prices are f.o.b. or f.o.r. Brisbane.

Paris Green, which costs about 2s. per lb., is a violent poison, and must be kept under lock and key, out of reach of children.

The former insecticide is for use against leaf-eating caterpillars and beetles, which at times prove very destructive to cane leaves. Grasshoppers and "Army-worms" are the chief offenders, and notable invasion should be combated with as little delay as possible. A spray consisting of 1½ to 2 lb. of lead arsenate in about 50 gallons of water has proved quite effective.

Paris Green is used in baits made up for controlling crickets, grasshoppers, and other cane pests.

Care of Spraying and Injecting Hand-Pumps.

No grower should be without a good spray pump; as otherwise he is powerless to repress the activities of the abovementioned, or combat orchard or vegetable pests which make their appearance on the farm from time to time. For field work a Knapsack pump will be found useful for spraying local infestations of army-worms or small beetles eating the leaves of cane. One having a liquid capacity of about 3½ gallons can be carried conveniently, and costs about £2 5s. When buying a spray pump, be sure and see that it be made of brass or copper, and fitted with an effective agitator and large compression cylinder, ensuring even distribution of the chemical being used. Remember that all such machines last very much longer if cleaned thoroughly each time after use; rinse out the container with clean water before putting the pump away, and run plenty of water through the hose and nozzle. Keep the exterior clean and well oiled in all working parts.

The above advice applies also to hand injectors used for fumigating cane grubs, the inside parts of which, such as washers, nuts, &c., are very liable to get out of working order unless properly cared for when put away at the end of the season.

ENTOMOLOGICAL HINTS.

The Director of the Bureau of Sugar Experiment Stations, Mr. H. T. Easterby, has received the following Entomological notes from Mr. E. Jarvis, Entomologist at Meringa, near Cairns:—

At the Cairns Show (18th-21st July) opportunity was afforded for meeting many of our canegrowers and having a chat over general matters relating to the control of various insect pests attacking cane. The chief questions discussed were those of (1) grub fumigation; (2) collecting "grey-back" beetles; (3) the protection of such friendly insects as predacious larvæ of "Robber Flies" and "Skip Jack" beetles; and (4) the Digger Wasps and Tachinid fly parasites of our notorious cockchafer beetle and Weevil Borer of sugar-cane.

Considerable interest was manifested by those present in this annual exhibition of the activities of the Sugar Bureau; and thanks are due to the Cairns Show Association for providing accommodation for the display of insects, diagrams, spirit specimens, &c., illustrating the entomological side of sugar-cane.

White Ants attacking Cane Setts and Sticks.

Damage caused by termites (white ants) consists in destruction, by the Worker and Soldier forms of a community, of (1) newly planted setts and the young shoots arising from same; (2) invasion of the setts and growing cane sticks from below ground level; or (3) ultimate removal of the entire internal cellular tissue of the sticks, thus reducing such canes to mere hollow tubes, nothing being left but the rind.

Such injury as that described under No. 3 can be recognised externally by a wilted or brown appearance of the central heart-leaves. Common-sense control methods should be practised when possible, the first step in this direction being a careful survey of the extent of an infested area, with view to discovering sources from which invasions may have originated. Such line of procedure often proves successful on farms where this pest has just made its appearance and has not had time to obtain a secure footing. One should try to trace as far as possible the direction of any tunnels discovered amongst the cane stools. A slender twig from which the bark has been peeled will often be found helpful in such work of tracing a tunnel without risk of losing its direction through friable soils. The grower should also destroy any termitariums (anthills) situated near his headlands by fumigating them with Plume benzine. This can be done by merely removing a piece of the hard exterior casing (about the size of a small saucer) from the apex of the nest and pouring into the cellular interior about a pint of the fumigant. The hole thus made should then be closed up with a lump of moist soil previously consolidated by kneading. Termitariums treated in this way at Meringa gave a mortality when opened up of from 97 to 100 per cent.

Importance of Clean Seed.

During planting operations reject all setts showing indications at the cut ends of termite tunnels or those of either moth or beetle borers. Avoid procuring seed from localities in which the "Giant Termite" (*Mastotermes darwiniensis* Frogg.) or the weevil borer of cane are known to occur plentifully, as by means of such diseased seed these insects often obtain a footing in clean canefields, and may gradually become firmly established.

TO SUBSCRIBERS—IMPORTANT.

Several subscriptions have been received recently under cover of unsigned letters. Obviously, in the circumstances, it is impossible to send the journal to the subscribers concerned.

It is most important that every subscriber's name and address should be written plainly, preferably in block letters, in order to avoid mistakes in addresses and delay in despatch.

General Notes.

Staff Changes and Appointments.

Messrs. A. Boyd, C. Gray, H. Searle, H. Tomkeys, and H. Lowen, of Mount Morgan, have been appointed Honorary Rangers under the Animals and Birds Acts for the sanctuary which includes the property of the Mount Morgan Gold Mining Company Limited.

The following have been appointed members of the Southern District Stallion Board:—A. H. Cory, M.R.C.V.S. (Chairman), S. H. Harding, P. Short, and J. Sprott.

Mr. E. C. Dunn, Inspector of Stock at Boondooma, has been appointed also an Inspector of Slaughter-houses.

Mr. R. E. Soutter, Manager of the State Farm, Roma, has been appointed Wheat Breeder, Department of Agriculture and Stock.

Mr. N. C. Copeman, Inspector of Stock, Department of Agriculture and Stock, has been transferred from the Helidon Cleansing Area to the Kingaroy Cleansing Area.

Messrs. C. W. Knack (Broadmere, Taroom) and T. D. Hall (Wythburn, Taroom) have been appointed Honorary Stock Inspectors.

Mr. C. S. Smith, Accountant, and Mr. B. W. Lennon, Mill Superintendent, of Mount Morgan Limited, have been appointed Honorary Rangers under the Animals and Birds Acts in respect of the sanctuary at Mount Morgan.

Messrs. W. V. McClelland and F. A. Goodman, Overseers of the Mount Spec and Cairns-Port Douglas Roads, have been appointed Honorary Rangers under the Native Plants Protection Act.

Messrs. T. Bryant, Toogoolawah, and William Meharg, Eukey, have been appointed Honorary Rangers under the Animals and Birds Acts.

The Officer in Charge of Police at Biloela has been appointed also an Inspector under the Slaughtering Act.

Constables W. R. Perry (Palmwoods) and W. J. Falvey (Cleveland) have been appointed also Inspectors under the Slaughtering Act.

Mr. St. G. Thorn has been appointed Bacteriologist at the Animal Health Station, Yeerongpilly.

The Officer in Charge of Police, Kajabbi, has been appointed also an Acting Inspector of Stock.

Mr. D. F. Stewart, of the Veterinary School, University of Sydney, has been appointed a Government Veterinary Surgeon, and will be stationed at the Animal Health Station, Yeerongpilly.

Atherton Maize Board.

The Governor in Council has approved of the issue of an Order in Council under the Primary Producers' Organisation and Marketing Acts, extending the operations of the Atherton Tableland Maize Board for a period of ten years from 1st July, 1933, to 30th June, 1943.

A Notice of Intention to extend the Pool was issued on the 17th March last, and growers were given the opportunity of petitioning for a poll on the question of whether or not the Pool should be extended. A petition was received, and a poll conducted on the 12th July, which resulted in 136 votes being cast in favour of continuance, and 104 against. The Order in Council issued to-day accordingly provides for the desired extension of the Pool Board for a further ten years.

Banana Board.

The Governor in Council has approved of the issue of an Order in Council renewing for a further twelve months the levy for the maintenance of the Banana Industry Protection Board.

Assessment at the rate of 1½d. per case containing one and a-half bushels or less for all bananas marketed in the case and 2d. in the £ or part thereof on the proceeds of sales of all bananas marketed in the bunch, was levied during last year, and this will again be enforced this year.

Sanctuary at Lockyer.

An Order in Council has been issued declaring "Springbrook," the property of Mr. K. Rossiter at Lockyer, a sanctuary under the Animals and Birds Acts. It will now be unlawful for any person to take or kill any animal or bird on this property. Mr. Rossiter's son, Mr. H. K. Rossiter, has been appointed an Honorary Ranger for the purposes of the sanctuary.

Tomato Marketing.

An Order in Council has been issued under the Fruit Marketing Organisation Acts, providing for the acquisition of tomatoes by the Committee of Direction of Fruit Marketing for the period from 15th September, 1932, to 15th December, 1932. A regulation was issued on the 14th July last, empowering the Committee of Direction to conduct a ballot of tomato growers to decide this question, and the ballot which closed on 13th August resulted in 70.71 per cent. of the votes polled being in favour of the acquisition. The Order in Council to give effect to the acquisition has now been issued, and will apply to tomatoes produced within those districts which may be briefly described as the area bounded on the north by Rockhampton, on the west by Rosewood, and on the south by the New South Wales border, and including the islands in Moreton Bay. The acquisition is desired for the purpose of ensuring that tomatoes consigned to Southern markets conform with the present maturity standard, are unblemished, and correctly graded.

Peanut Board Election.

The election of two members on the Peanut Board resulted as follows:—

District No. 1 (Wienholt and Nanango)—

Norman James Christiansen (Wooroolin) .. .. .. 87 votes.

Frederik Christian Petersen (Kingaroy) .. .. .. 73 votes.

District No. 3 (Rest of Queensland)—

Albert George Whiting (Atherton), returned unopposed.

Messrs. Christiansen and Whiting will therefore be appointed for a term of two years, as from the 28th August.

Brand Registration Fees.

Regulations have been issued under the Brands Acts, which provide that the brands fees shall, in future, be as follows:—

	£	s.	d.
For the first registration of a Horse and Cattle Brand (other than a symbol brand)	1	0	0
For the registration of a Symbol Brand	7	10	0
For the registration of a Cattle Earmark	1	0	0
For the registration of a Cancelled Horse and Cattle Brand ..	3	0	0
For the registration of a Sheep Brand consisting of one or more letters of the alphabet, or numerals, or of a letter and numeral	0	5	0
For the registration of a Sheep Brand consisting of a sign or symbol or conjoined letters or numerals	3	0	0
For the registration of a Sheep Earmark	0	10	0
For the transfer of a Horse and Cattle Brand	0	10	0
For the transfer of a Sheep Brand and Sheep Earmark	0	5	0

Pests and Diseases of Tobacco.

Executive approval has been given to the issue of a Proclamation under the Diseases in Plants Acts, declaring the following pests and diseases of tobacco to be pests and diseases within the meaning of the abovementioned Acts:—Black Root Rot, Black shank of Tobacco, Blue Mould, Damping-off Fungi, False Wireworm, Frog-eye, Green Tobacco Looper, Leafhoppers, Mosaics, Phyllosticta Leaf Spot, Tobacco Stem Borer, and Wireworms.

An Order in Council has also been issued which will provide that every occupier or owner of land used in the growing of tobacco plants shall uproot, and where practicable, destroy plants by burning, within one month after the completion of the harvesting of the tobacco leaf. Every paddock shall be treated in the above manner, and where there have been plantings at separate intervals in different parts of one area, similar action must be taken after harvesting of the leaf from each separate planting.

Pineapple Levy.

Executive approval has been given to the issue of Regulations under "*The Fruit Marketing Organisation Acts, 1923 to 1930,*" empowering the Committee of Direction of Fruit Marketing to make a levy for the purposes of the said Acts on all pineapples marketed for the year ending 19th August, 1933.

The Regulations provide that the levy shall be payable by growers of pineapples on the basis of the quantity of fruit marketed, and shall be at the following rates:—

(1) One penny per case on all pineapples sold, or consigned whether by rail, road, or boat, to factories.

(2) One farthing per ton on all pineapples sold, or consigned by rail to any agent, person, or firm in Queensland, other than a factory.

(3) One halfpenny per case, with a minimum of 1d. on all pineapples sold, or consigned otherwise than by rail to any Queensland railway station to any agent, person, or firm, except a factory.

The levy shall be deemed to have been made upon publication by the C.O.D. of particulars of such levy.

All agents or persons who at any time hold moneys to the credit of growers shall pay to the C.O.D. the amount of levy payable by the growers concerned.

The levy on all pineapples railed from any Queensland railway station (other than Townsville, Rockhampton, Roma Street, Woolloongabba, Brunswick Street, South Brisbane, or Central stations) to any other railway station in the State, and not consigned to factories, may be collected by the Commissioner for Railways to the extent of ½d. per ton.

Subject to the above, and except as hereafter provided, the levy in the first instance shall be collected—

(1) On all pineapples sold or consigned to factories, whether by rail or otherwise, by the C.O.D. to the extent of 1d. per case.

(2) On all pineaples sold or delivered otherwise than by rail to any Queensland railway station to any agent, person, or firm, other than a factory, at the rate of ½d. per case, with a minimum of 1d.

The levy shall be collected in the case of agents or persons other than the C.O.D. or the Commissioner for Railways, by means of levy stamps, obtainable from the Head Office of the C.O.D., Brisbane, which shall be affixed to account sales. Such agents or persons will be entitled to deduct the value thereof from moneys held to the credit of growers, and levies so collected shall be paid to the C.O.D., Turbot street, Brisbane.

In the case of pineapples sold privately by the grower (that is, fruit not delivered to any agent or sent away by rail), the grower must furnish the C.O.D. with a monthly statement of sales, and pay the levy at the Head Office.

If the amount of levy is not collected by the Railway Commissioner or by the agents or persons concerned, then without prejudice to the liability of the Commissioner or agent, such shall be payable by and recoverable as a debt from the grower.

Any agent, person, or company which receives pineapples for sale on commission shall permit any authorised officer of the C.O.D. to inspect their books and accounts.

The sums raised by the levy shall be expended by the C.O.D. in the interests of the pineapple industry of Queensland.

These regulations differ from previous regulations in regard to the pineapple levy, in respect of the arrangements made with the Commissioner for Railways to collect the levy on behalf of the C.O.D. on pineapple consignments in Queensland, with the exception of those from Townsville, Rockhampton, and Brisbane.

Acquisition of Canary Seed.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Acts, vesting in the Canary Seed Board the ownership of all canary seed grown in Queensland. On the 23rd June last a Notice of Intention to make this Order in Council was issued, and growers were given the opportunity of petitioning, before the 25th July, for a poll on the question. No petition, however, was received, and the Order in Council, as abovementioned, has now received Executive approval.

Plane Creek and Racecourse Sugar Levies.

Regulations have been issued under "*The Primary Producers' Organisation and Marketing Acts, 1926 to 1930,*" empowering the Plane Creek Mill Suppliers' Committee to make a levy of one-half penny per ton on all sugar-cane supplied to the Plane Creek Mill, and also empowering the Racecourse Central Mill Suppliers' Committee to make a levy of threepence per ton on all sugar-cane hauled over the Silent Grove tramline to the Racecourse Central Mill. Both levies will be used for financing farmers' representatives at the Plane Creek and Racecourse Central Mills. Suppliers to the Plane Creek Mill, and suppliers to the Racecourse Mill in the Silent Grove district, are given the opportunity of petitioning, on or before the 5th September, 1932, for a poll to decide whether or not the abovementioned levies shall be made.

Dairy Science School.

It was very pleasing to note the success which attended the first Dairy Science School held by the Department in Toowoomba, said Mr. F. W. Bulcock, Minister for Agriculture and Stock, recently, in discussing the matter of the extension of the educational activities of the Department. The school at Toowoomba was held for the benefit of butter and cheese factory operatives and proved an outstanding success, members attending from all parts of the Darling Downs. The comprehensive range of lectures was no doubt responsible for such a good attendance, continued Mr. Bulcock. A feature of the programme arrangement which appealed to many members was the segregation of subjects, which permitted those not able to attend the whole course to be present on the days of special interest to their particular section of the industry, whether butter or cheese. The interest in the school was also increased by the lectures delivered by factory officials of wide experience. These lectures led to many interesting discussions, and were undoubtedly of great value to the younger members of the school. The Department, said Mr. Bulcock, was indebted to those who had co-operated so wholeheartedly towards the success of the course.

It is proposed to hold a further Dairy Science School at Maryborough from the 22nd to 26th August on similar lines to that conducted at Toowoomba.

PLATE 126.—SCRYMGEOUR.

Mr. J. T. Scrymgeour, of the Netherby Stud, Warwick, and his champion Shorthorn bull "Netherby Royal Challenge," at the Brisbane Show. Mr. Scrymgeour's success was a popular one. Though handicapped by complete loss of sight, the result of wounds received on active service with the Australian Imperial Force, he carries on a notable Shorthorn stud with a great show ring record.

Rural Topics.

The Sheet Anchor of Human Salvation.

Mr. Henry Ford, the American millionaire producer of motor vehicles, also has a strong leaning to the land as the sheet anchor of human salvation. In a series of articles now running in the American Press he says: "The land! That is where our roots are. There is the basis of our physical life. The farther we get away from the land the greater our insecurity. From the land comes everything that supports life, everything we use for the service of physical life. The land has not collapsed or shrunk in either extent or productivity. It is there waiting to honour all the labour we are willing to invest in it, and able to tide us across any dislocation of economic conditions. No unemployment insurance can be compared to an alliance between a man and a plot of land. With one foot in industry and another foot in the land human society is firmly balanced against most economic uncertainties. With a job to supply him with cash and a plot of land to guarantee him support the individual is doubly secure. Stocks may fall, but seedtime and harvest do not fail." But they do fail, sometimes, in Australia, and even Mr. Ford's own country—"God's own country"—is not altogether immune against crop failures. Still, Mr. Ford is mainly right.—"The Queenslander."

Tattooing Live Stock.

According to Mr. Con O'Sullivan, of Greenmount, Queensland, Higgins' Tattoo Ink is the best ink of all for ear and body tattooing. He has used this ink with success on a large number of calves and older cattle, and states that identification is simplified and the job much more satisfactory when such a permanent ink is used. He is not sure whether this could be obtained in powder or paste form, but knows only the fluid ink in actual practice.

Cheap Pumping—Hydraulic Ram.

Any one having a spring, flowing well, waterhole, or stream on the farm from which can be secured a flow of two gallons or more a minute, and a difference in elevation of 3 feet or more, might install a hydraulic ram that will automatically pump part of the water to the house, barn, or any other part of the farm at practically no operating cost. Once started, if properly installed and adjusted, a ram will continue to pump water day and night without any attention other than an occasional inspection. The hydraulic ram utilises the momentum generated by flowing water to elevate a part of the water to a height above the source of supply. While the ram is made to operate on as low a fall as 3 feet, and as small a supply as two gallons per minute, the greater the amount of fall the greater will be the amount of water pumped.

As a general rule there should be 1 foot of fall between the source of supply and the ram for each 6 feet to 12 feet of elevation to which the water is to be pumped. In other words, with 3 feet of fall water can be forced from 18 feet to 36 feet above the ram. Water can be used direct from the ram or from a storage tank which is kept filled by the ram. The most common method is to use a storage tank with waste overflow, so that a large supply is available. To determine if a ram can be used, first find out the flow of the spring in gallons per minute. To do this, dam the water up, and with a short trough or piece of pipe conduct the water into a bucket of known capacity. A kerosene tin, which holds 4 gallons, is useful for the purpose. The exact time it takes to fill the bucket is noted, and the gallons per minute of flow calculated. If the flow is sufficient the next step is to find the head or fall available; that is, the vertical distance from the water supply to the place where the ram can be located and the waste water drained off. If a surveyor's level is not available, an ordinary carpenter's level can be used for determining the head or fall. The horizontal distance through which the head is obtained should also be noted.

The third step is to measure the height to which the water is to be raised above the ram; that is, the height of the storage tank above the ram. The horizontal distance from the ram to the storage tank must also be known. After all this information is secured the approximate amount of water delivered per hour can be determined by the following simple method:—Multiply the number of gallons the spring flows per minute by the fall or head. Multiply this by 40; then divide the result by the number of feet the water is to be elevated above the ram. The result will be the approximate number of gallons delivered per hour. After making the above measurements and calculations, if it is found that a ram will deliver sufficient water, write any reputable manufacturer or dealer in hydraulic rams, giving the measurements as explained above.—The "Country Gentleman."

Price of Farm Products.

"The Prairie Farmer," always a staunch champion of the man on the land in the United States, waxes indignant over the failure of politicians and "big" business men to realise the urgent need for measures to assist the farmer to get better prices for his produce:—"The collapse in values, hunger, and want in a land of plenty, confiscation of the savings of a generation, are all unnecessary. Once we divert our attention from the privileged classes to the common people, and try to relieve their distress, results can be accomplished quickly. Let us hope that the Liberty Bells that rang out across the prairies of Illinois on 4th July will usher in a new day for the folks who work for a living."

The paper expresses a hope, however, that better things are in store. "Now a saner view prevails. Business leaders wonder how they could ever have imagined that their prosperity could be permanent with the farmers of America unable to buy. They agree now, and so do the political leaders, that higher farm prices must lead the way to better times. The farmer no longer fights alone, and hope for victory grows brighter. There is no reason why farm prices should not be higher. Over-production is largely a myth. Prices of farm products could be doubled without seriously affecting the consumer. In fact, most consumers would be greatly benefited, for that increased farm buying power would open the factory doors and give them their jobs back. What American business and American labour need is customers. Those customers are right at hand—millions of them—on the farms of America. Their needs are endless. They lack only the money to buy, and a reasonable advance in the price of farm products is all that is required to supply that."

The Canadian farmers also are urging prompt action to assist the farming community, and are demanding a special session of the Legislature of the Province of Alberta to deal with a proposal to make the past debts of farmers payable in wheat at a set price. They ask for a set price so that the creditors may be compelled to bear a part of the losses now borne wholly by the farmer. That is one of the world's problems just now—how to adequately compensate the farmer for his toil. He is at the mercy of the winds, and does not know from day to day what is to be the result of his industry. In no other occupation is the return so uncertain. Yet countries like Australia are dependent upon the welfare of the primary producer for their very existence.

An English writer offers the opinion that land, when all is said and done, is the safest and surest investment for the future. It is the one possible asset that cannot be over-produced. "I know personally several comparatively wealthy men," he says, "who take this view, and who are now looking for, or have bought, land because they consider this the safest of all lock-ups for their capital. I shall be surprised if we do not see this tendency grow, and farmers who own their land or have long-term leases are likely to feel the benefit of this move of capital 'back to the land.'" He points out that, with every commodity except gold, which has no utilitarian value, production to-day exceeds the consumption. But land does not increase. This explains why land, although it has decreased in value, has not suffered depreciation comparable with the depreciation in any other field.—"The Queenslander."

An Appeal to Youth.

Preaching at Chatswood (Sydney) Presbyterian Church recently, Rev. G. R. S. Reid, ex-Moderator, spoke of the need for national unity and co-operation between all sections, for the good of the community. Different classes of people, he said, needed to recognise their mutual dependence upon one another. The divine ideal for the State and the Commonwealth could only be reached by common devotion to God and by common loyalty to each other, all learning to live and work together in harmony with His will and purpose. It was a task which called for the united service of all. It demanded the experience and steadiness of age, and also the energy and enthusiasm of youth. They must look to the young to produce leaders who would guide the country to higher levels. Men were needed with Christian character and principle and a sense of personal honour, public duty, and civic responsibility. It was time Christian people took a united stand against godless communism, and made the church a real force for truth and righteousness in the nation.

Economical Calf Ration.

Calves started on whole milk and later changed to a gruel at the Maryland Experiment Station made rapid gains and at a cost of $19.61 for the first six months of age. The gruel was made as follows:—1 part dry skim milk, 1 part ground oats, 1 part wheat bran, 1 part corn meal, ½ part linseed meal, 1 per cent. salt. Calves liked the dry skim milk, and one part extra was added to the gruel until calves were sixty-three days old, when the above formula was used, until they reached three months of age, when milk was discontinued, and the grain mixture without milk was fed until calves were six months of age.

Live Stock Sense.

It is a well-known fact that some animals have the powers of sight and smell developed to an exceptional degree, others have a keen sense of hearing. The racehorse has powers, unheard of, even in human life; the trained sheep dog has the sense to understand every word and sound his owner makes during the exciting sheep-dog trials, now a feature at Agricultural Shows; the wolf and many other wild and domestic animals have a very keen sense of smell and can follow a trail for many miles. Science has, in recent years, definitely proved that domestic animals have an equally keen sense of taste just as human beings have under modern conditions of life. It has been proved also that good use can be made of this sense of taste in giving animals the opportunity to select for themselves, a diet that is not only balanced but is of advantage in early maturity and rapid growth. It has been pointed out by some overseas authorities that if animals are given the proper chance they will select a diet even more suitable than that compounded by man, but it is not always convenient or possible to give them the free choice style so much preferred.

A noted American poultry specialist, we are told, has a chicken cafeteria where the chickens may have the opportunity of selecting for themselves the foods they prefer from a number of foods placed in containers in convenient areas in the yard.

It will be noted that whereas cattle are particularly careful of the foods they consume and will not attempt to eat coarse or rank grasses, horses will come along and appreciate the grasses the cattle refuse to eat.

Pigs are very fussy over their food, if they are well fed and are not actually hungry; dogs are extremely careful and some dogs can be so trained that they will absolutely refuse to eat any food except that which is given to them by their master or the person in charge.

The hungry, half-starved animals' senses are so dulled that nature asserts itself and the animal will eat almost anything so long as it satisfies the craving for food.

The subject is an interesting one and one that can be put to good use in the feeding and care of live stock; in fact it pays handsomely to study the diet and to provide those foods which give the best results and which are not only productive but are appetising and palatable. The free choice style of feeding has much to commend it and where it can be taken advantage of is well worth trial.

Sowing Wheat—Points in Setting the Drill.

An important operation connected with sowing is the proper setting of the drill according to the variety and condition of the seed. A drill set to sow, say, 50 lb. of Federation per acre will often sow as much as 60 lb. of small "shotty" seed. Treating seed with bluestone also makes a great difference; seed treated with copper carbonate runs more freely than that treated with bluestone. Atmospheric conditions also influence the flow of seed through the drill.

Many farmers make the mistake of taking it for granted that the drill will sow large grain and small grain at the same rate, whereas the larger the grain the more slowly will it run through the drill, and if this factor has not been taken into account the farmer will find himself well astray in his estimate of the amount of seed necessary to sow a particular paddock or area. It is safe to reduce the drill to sow about 40 lb. of "shotty" grain as compared with 50 lb. of an average sample of Federation.

Again, a variety will often vary with the season. Seed harvested before rain, for instance, is appreciably heavier and more "shotty" than the same variety harvested after rain, and the drill should be set accordingly.

The farmer will find it advisable in starting to sow, to weigh the seed used over a known area, when it will be possible to calculate with a great degree of accuracy the amount required to sow the whole paddock.

The cleaning out of the wheat-cups in the drill is another operation that frequently troubles the farmer. If he wishes to keep his paddocks absolutely clean by avoiding a mixture of varieties, he can run out the seed that remains in the drill on to the headlands, but this obviously is not a good practice.

If the drill be examined, an opening will be found in the iron plates at the end of the seed box, and working just inside the hole is the end of the square iron bar that agitates the feeders in the cups. A key is supplied with most makes of drills to fit through the hole in the plate on to the square end of this iron bar. A few turns of the key will soon empty the cups of any wheat they may contain, and the mixing of varieties is avoided with a minimum of trouble and without the waste associated with the tipping of the grain remaining in the drill on to the headlands.—A. and P. Notes, New South Wales, Department of Agriculture.

Getting the Best from the Herd—Intelligent Testing.

Addressing the recent North Coast conference of the Agricultural Bureau, Mr. G. S. Stokes, manager of Kempsey Butter Factory, New South Wales, drew attention to several facts of which dairy farmers in general might well take note.

The system of recording the production of each cow in the herd, said the speaker, was now within the reach of every dairy farmer: "I know that you will take me to task and say that the way things are at the present time, with the low price of butter, &c., you cannot afford it. But I would like to say that I am sure that you must afford it—you cannot do without it. When in times like the present a business man finds that his costs of production are going up and profits coming down, he seeks the reasons, and you are in exactly the same position. Your profits are coming down, and you must find where your weak spots are.

"To get the best out of herd testing it must be used intelligently, and before commencing to cull I think you should set a standard that you intend to work up to; then you can cull a few cows each year that do not come up to the standard you have set, starting on a reasonably low standard, say, the average of the cattle throughout the State for the previous year. Each year you could then set yourself a higher standard."

With regard to the causes of cream being graded into seconds, the speaker pointed out that uncleanliness was undoubtedly the chief source of trouble.

"The use of cold water for washing up is far too common, especially at night. Then we find that, although dairymen start off with hot water they usually finish up using cold water, and not only cold water, but water which, by the time they are finished, is mixed with milk and dirt which has been washed off the utensils.

"There is only one way to clean utensils properly, and that is by having scalding water to finish up with. By this I mean that the utensils should be first washed in lukewarm water to which a little soda has been added, then thrown into boiling water and allowed to lie there for at least five minutes. Then when they are lifted out they should be dried immediately, and bacteria have no chance of multiplying on their surface, as all the bacterial food is washed off. The utensils should then be hung up in a clean place. Brushes only should be employed in washing—rags should on no account be used in the dairy."

Dairy farmers were recommended to follow the "three C's" by keeping their cream clean, cool, and covered.

Benzine Cans as Milk Containers.

Benzine cans are frequently converted into buckets and used for holding milk and cream and for other purposes. As ordinarily used, however, they are objectionable owing to the grooved seams round the bottom and in the corners, as well as where the top has been cut out. Rust soon forms in these crevices, and as they cannot be easily cleaned they act as lodging places for decaying milk and cream.

To make such tins suitable receptacles for milk and cream, the grooved and folded seams and the cut seam at the top should be smoothly flushed with solder prior to use. The bottom corners of these improvised cream buckets are the most difficult to keep clean, and a good plan is to melt a little extra solder into these corners to form a smooth triangular-shaped filling. If all the seams are treated in this way a very useful and sanitary dairy utensil will be provided, and the life of the can will be greater.

Deep Tillage.

The only true test of good farming is to produce the maximum yield per acre at the minimum cost consistent with good farming. This yield will never be obtained unless the soil is well and truly tilled. Deep tillage on the rich easily worked loams is as good as a coat of dung, for no land can make the best use of manure unless it is suitably prepared to receive the dressing. Again, no amount of merely mechanical working will make the soil fertile unless organic manures, such as dung, or green manures, such as crops of mustard, tares, and clovers, are occasionally ploughed in. Moreover, artificials are needed in addition to the organic manures, for they provide the plant with nourishment that is easily available and ensures it having a kick-off at the start of its career. The soil is the farmer's raw material, and must be treated well if it is to give a paying return, whether this return be in crops or in grass.—"Live Stock Journal" (England).

How to get Quality Milk.

A new Advisory Leaflet (No. 29), issued by the Ministry of Agriculture and Fisheries (Great Britain), gives some useful and interesting notes on circumstances affecting the quality of milk.

Dairy breeds differ widely in regard to the quality of milk, and there are also individual differences with a breed. The ability to produce rich or poor milk seems to be hereditary, this trait applying equally to both parents. The herd owner who wishes to grade-up his herd should, therefore, keep careful yield and quality records of the milk produced by each cow, so that he may be guided in the selection of the cows from which to breed, and he should also exercise every care in the selection of the sire. If the owner favours a particular breed on the ground of quantity production, and desires to raise the average quality of the milk of his herd immediately, it is usually advisable to include a few animals of a "high-quality" breed, such as the Guernsey or Jersey.

Interval Between Milkings.

Uneven intervals between milkings are, perhaps, the commonest cause of wide variations in quality, the butterfat easily varying to the extent of 2 or 2.5 per cent. The farmer should aim at a night interval of not more than thirteen hours, and the heavy-yielding cows should be milked last in the evening and first in the morning.

Quality is often affected by inefficient milking. Milking should be done quickly, quietly, and thoroughly, the cow being treated with every consideration. Thorough stripping is essential, as the fat content of the last milk so obtained is often as high as 7 or 8 per cent. Moreover, rough stripping will result in loss of butterfat and injury to the udder muscles.

As the chemical quality of milk from individual cows varies, the milk should be bulked in the churns so as to represent the average quality of the herd. Any high-quality cows should be so housed as to ensure an even distribution of their milk throughout the bulk. Proper bulking is particularly important where milk is bottled on the farm; neglect of it has led to wide variation of fat content in the highest grades of milk.

Contentment, which is fostered by comfortable housing, ample light, and ventilation, tends to increase the general quality of milk produced. The quality is often affected by indisposition, recent calving, chill of the udder, abnormal conditions, and any unusual excitement. The general condition of individual cows should, therefore, be kept under observation by stockmen, and during any abnormal period the milk should either be tested or withheld temporarily from the bulk.

Balanced Rations.

Experiments have shown that if a cow is well nourished no alteration or improvement in feeding will permanently alter the quality of her milk. Where, however, a herd is receiving an unbalanced ration containing too great a bulk, too much starchy matter or oil and an insufficient albuminoid and mineral content, improved feeding may raise the general quality of the milk, particularly in the case of a solids-not-fat deficiency.

The solids-not-fat content is sometimes adversely affected when the herd is turned out to spring grass. The reason has not yet been ascertained, but in the meantime it would seem worth while to try the judicious use of suitable concentrates, preferably those low in albuminoid content. Similar care is needed towards the end of the grazing season.

There is frequently a slight depreciation of chemical quality when lactation is extended beyond the normal period (nine to eleven months), and in abnormal old age. These factors are unlikely to influence the quality of milk from the whole herd unless the average age of the cows is unduly high and calving-down in practised only at certain periods of the year. In such cases, the remedy is simple and obvious.

It is improbable that all the above factors will be found in any one herd, but where the chemical quality is low some of the factors will probably be present. The exact cause can be determined only by investigation, based on reliable information. Accurate records of yield, fat content, and solids-not-fat content for the herd as a whole and for individual cows are, therefore, essential. Any producer who experiences difficulty in keeping such records, or requires advice on rationing, should approach the County Agricultural Organiser, who is available to give expert advice and to assist in improving the general standard of milk production.

The Ideal Fallow—The Processes by which it is Obtained.

In order that soil moisture may be available to the roots of the young wheat plant, the fallow must be firm up to within about 2 in. of the surface at time of sowing, observed the Director of Agriculture (New South Wales) in a recent address to wheatgrowers, and in loose open soils the chief problem was to achieve the necessary consolidation. The farmer with a soil of a clayey nature, on the other hand, must cultivate it in such a way that the surface was prevented from setting too hard. With the ideal fallow in mind, the farmer should set out to study the peculiarities of the various classes of soil he had on his farm, and adopt whatever methods were necessary to bring about the desired condition. The work of fallowing might be divided into three parts—first, the opening up of the land by ploughing or scarifying to allow the rain to enter and to give a surface suitable for cultivation; secondly, the cultivation of the land during the year to conserve moisture; and, thirdly, the bringing about of the right degree of consolidation.

Although the first working of the land generally consisted of ploughing, it should not be taken for granted that ploughing was essential. An important thing was that the first working should be done as early as possible. Taking the conditions in that district (Tullibigeal) as an example, the speaker pointed out that recent rains had saturated the soil, and if the land was worked quickly much of the moisture would be held in the soil for the following year's crop, whereas if the work was delayed this moisture would be lost. Ploughing was naturally slow work, but scarifying could be done more rapidly, and it was probable that on much of the light soil of the district that did not set and which absorbed moisture fully, the land could be more efficiently prepared by scarifying than by ploughing. On clay soils which were inclined to set it was necessary to give deeper working than was possible with the scarifier, and it was also necessary to avoid using implements which made the soil too fine. It was for this reason that it was inadvisable to use disc implements.

The Subsequent Workings.

Having completed the first working, the next job was to proceed with the work of obtaining consolidation and of conserving moisture. The first working left the land rough and cloddy, and to bring about consolidation and to help in conserving moisture it was necessary to comb it. This meant bringing the clods to the surface and getting the fine soil down below. Clods underneath were harmful, as they kept the soil loose, but they were useful on the surface, as they broke the fall of heavy rain and prevented compaction of the surface.

This combing was done with the springtooth cultivator, working to the full depth. If circumstances permitted, it should be done as soon as possible after the first working and without waiting for rain. After this was done no further working was given until rain fell. Immediately after each substantial fall of rain the surface should be cultivated in some way. The reason for this was that rain brought all the soil particles together right to the surface and moisture rose freely to the top where it evaporated at a great rate. Moisture could not move in the soil, however, if the soil particles were not touching, and the fallowed land should therefore be kept stirred on the surface to maintain a loose condition which would prevent moisture coming to the top. It was essential also that the work should be done quickly, as up to 1 in. of moisture might be lost per week if the surface was packed.

The depth of working should be decreased with each working with the object of ensuring that when the time came to sow the proper degree of consolidation would have been attained. Just as in regard to the initial preparation, each farmer must decide for himself how and in what way he would cultivate his land. The point that he must keep in mind was that if his soil was somewhat loose he must do everything to ensure consolidation, and the harrows should be used as much as possible. If, on the other hand, the soil was inclined to be fine and clayey and of such a nature that it became too compact after rain he must keep it more cloddy to prevent overmuch compaction. Wherever farmers had any special difficulties it was advisable to consult the local Agricultural Instructor.

Condition Most Conducive to Germination.

The advantages of correct fallowing were not confined to the conservation of moisture. After all, good germination was the main thing, and usually good preparation would lead to good germination. A firm seed-bed about 2 to 2½ in. from the surface with a loose top to act as a cover was in the best condition. Although the roller was not now used to any extent by wheat farmers, as it was generally unnecessary, there was no doubt that it would be useful in those seasons when it had been impossible to get consolidation. It was not possible, however, to get perfect consolidation except with the aid of rain and the adoption of correct methods of working the surface. It was for this reason that the old idea of deep ploughing

had been scrapped in favour of shallow ploughing. In many years there was insufficient rain to consolidate deeply-ploughed land. It might be accepted that the dryer the district the shallower should be the ploughing—taking into consideration the character of the soil—in order to ensure consolidation, so that a good germination would be obtained.

Depth of Sowing.

It was usually inadvisable to sow deeply (more than about 2½ in.), but in dry districts the seed must be put down on the seed-bed even if it was 3 or 4 in. down. It was dangerous, however, to put seed down so deeply, especially in clay soils that packed hard, as heavy rain would probably set the surface and prevent the plants getting through. Under such circumstances the plants could be helped by harrowing as soon as the land would carry the horses. Particular care must be taken to ensure that the seed was put on the seed-bed. Some of the combines did not do this satisfactory as loose soil ran in under the seed before it dropped on to the firm seed-bed. Sometimes also if a drill was drawn too fast by a tractor the hoes hopped and some of the seed was placed in the loose surface soil.—A. and P. Notes, New South Wales Department of Agriculture.

Harvesting Stone Fruits—Points in Picking.

In the harvesting of stone fruit it is preferable that it be picked when cool, but often in the peak period of any variety picking has to proceed throughout the day during very hot weather, and there is very little opportunity to allow it to cool off in the shade before it is packed. Fruit packed while still hot in this way will ripen more rapidly than similar fruit packed when cool. This will not be of much detriment if the fruit has not to be transported far to market and is quickly disposed of, but if the distance is great or sales are slow there is a probability of it becoming too soft before sales are effected.

For these reasons it can be seen that it is necessary for fruit that is to be despatched long distances if hot when picked to be allowed to cool off before packing. This can be done by allowing it to remain in partially filled open boxes which are stacked in the shade in an open manner so that the air can pass over and between the boxes. Any fruit picked during the latter part of the afternoon and not packed till the following morning should be held in the above way.

Fruit should not be packed while wet from rain, though if only wet from a very light passing shower or heavy dew it will soon dry if stacked as above. It is preferable not to pick directly after rain when the soil has been soaked, but often this cannot be avoided, and in some seasons to wait only means running into more rain.

The degree of maturity at which stone fruit is picked depends on the use it is to be put to, the distance it has to travel, and many other conditions. When fruit is grown close to the market it may be allowed to become far more mature before picking than when it has to be transported long distances.

Stone fruits very appreciably increase in size and improve in appearance during the last day or two of ripening, but even when grown close to market it is not always advantageous to wait for this increase in size; for instance, a bare market can sometimes be caught by picking earlier or the greatest demand on the market may be for fruit fit for reconsigning long distances. Generally speaking, when dealing with a large area of any one variety it is wise to start as soon as there is a picking of that variety sufficiently mature for market, for if one waits for larger pickings or greater maturity at the start there is risk of the crop overtaking one when at its height and appreciable losses occurring.

There are certain degrees of maturity at which fruit can be satisfactorily picked for market, and these are governed by several conditions as pointed out above, but these degrees are between two limits which must not be overstepped. The fruit should have reached such a degree of maturity when picked that it will not rapidly wilt, but will continue to ripen and sufficiently develop the flavour characteristic of the variety. On the other hand, it must be firm enough to stand the journey. To ignore either limit causes direct loss to the grower, but the ignoring of the requirement as to ripeness has also a far-reaching effect. The immature fruit or some of it is probably sold at reduced prices and passes into consumption. The consuming purchaser is disappointed and assumes that fruit is not what it used to be, or that it does not agree with him or his family; hence he turns to other foods.

PRODUCTION RECORDING.

List of cows officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Book of The Australian Illawarra Shorthorn Society, The Jersey Cattle Society, and The Friesian Cattle Society, production charts for which were compiled during the month of July, 1932 (273 days' period unless otherwise stated).

Name of Cow.	Age.	Milk Production.	Butter Fat.	Owner.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
Empress 9th of Rosemount	Mature	13,256·65	521·533	C. O'Sullivan, Greenmount
Daisy VI. of Oakvilla	Mature	10,403·58	415·498	H. Marquardt, Wondai
Red Wings of Bellwood	Mature	10,717·9	403·092	W. G. Currant, Gunalda
Bella 8th of Kilbirnie	Mature	9,586·21	397·145	Macfarlane Bros., Radford
Champion 3rd of Oakvilla	Mature	9,556·28	384·532	H. Marquardt, Wondai
Flower 10th of Rosemount	Senior (4 years)	14,373·75	547·836	C. O'Sullivan, Greenmount
Pensive of Nestles	Senior (4 years)	9,063·91	372·835	H. M. Graham, Goomeri
Plummet of Nestles	Senior (4 years)	7,797·01	342·659	H. M. Graham, Goomeri
Norah 12th of Morven	Junior (4 years)	10,576·4	467·589	R. Mears, Toogoolawah
Beauty of Hillvale	Senior (3 years)	12,681·65	421·560	W. H. Thompson, Nanango
Rosebud V. of Springdale	Senior (3 years)	9,365·85	372·214	V. Dunstan, Wolvi
Pansy of Rockleigh	Senior (3 years)	8,542·7	357·607	T. Strain, Wondai
Princess 9th of Fairlie	Senior (3 years)	8,962·5	353·747	C. B. Mitchell, Warwick
Gwen III. of Golelea	Junior (3 years)	7,507·89	325·364	E. M. Franklin, Wangalpong
Fraulein of Wilga Vale	Junior (3 years)	6,672·62	277·17	C. O'Sullivan, Greenmount
Blacklands Salome	Senior (2 years)	7,671·25	355·791	G. A. Meyers, Imbil
Lovely 4th of Loomhurst	Senior (2 years)	8,243·55	314·047	T. Shuttlewood, Peachester
Lucy 23rd of Millstream	Senior (2 years)	7,785·04	304·637	W. J. Barnes, Cedar Grove
Rosebud of Trevor Hill (265 days)	Senior (2 years)	6,563·65	283·484	Geo. Gwynne, Umbiram
Dahlia 4th of Arley (257 days)	Senior (2 years)	6,117·3	273·655	E. D. Lawley, Maleny
Fussy of Alphavale	Junior (2 years)	10,360·25	388·768	W. H. Thompson, Nanango
Lassie of Glendalough	Junior (2 years)	7,516·75	307·494	J. Lyndon, Worongary
Beauty II. of Golelea	Junior (2 years)	6,679·44	259·915	E. M. Franklin, Wangalpong
Lovely of Trevor Hill	Junior (2 years)	6,463·85	259·407	G. Gwynne, Umbiram
Noami 3rd of Springdale	Junior (2 years)	6,253·6	247·686	T. Shuttlewood, Peachester
Wunulla Stella	Junior (2 years)	5,768·5	246·162	J. Lyndon, Worongary
Favourite of Trevor Hill	Junior (2 years)	6,721·18	237·000	Geo. Gwynne, Umbiram
JERSEY.				
Lady of Calton	Mature	13,361·66	683·834	J. Collins, Tingoora
Marjorie of Newhills	Mature	7,873·5	404·349	J. Nicol Robinson, Maleny
Rosina of Southport	Mature	6,889·0	397·757	F. Porter, Maleny
Westwood Belle	Mature	6,549·25	378·883	F. Porter, Maleny
Newhills Cygnet 2nd	Mature	7,715·15	358·562	J. Nicol Robinson, Maleny
Westwood Cowslip	Mature	5,803·7	351·623	F. Porter, Maleny
Hetty of Calton	Junior (4 years)	9,278·31	497·714	J. Collins, Tingoora
Fern of Brook Lodge	Junior (4 years)	6,274·66	325·865	H. T. Mayers, Nambour
Trecarne Barleybread 2nd	Junior (4 years)	5,418·33	319·583	T. A. Petherick, Lockyer
Ellerdale Carrie 2nd	Senior (3 years)	6,333·8	388·651	H. M. Thomason, Mount Mee
Newhills Maid	Junior (3 years)	5,176·2	330·662	J. Nicol Robinson, Maleny
Rosevale Una	Junior (3 years)	5,354·4	295·895	H. F. Rowe, Kenilworth
Rosevale Bonnie Rose (268 days)	Senior (2 years)	5,439·6	305·142	H. F. Rowe, Kenilworth
Rosevale Gaiety	Senior (2 years)	5,332·85	285·719	H. F. Rowe, Kenilworth
Celia of Calton	Junior (2 years)	8,633·79	461·607	J. Collins, Tingoora
Coral of Calton	Junior (2 years)	6,589·75	338·261	C. Burows, Goomeri
Carnation Larks Violet	Junior (2 years)	5,958·3	324·314	N. Alcorn, Maleny
Crystal of Brook Lodge	Junior (2 years)	5,632·64	318·779	H. T. Mayers, Nambour
Westwood Rosette	Junior (2 years)	4,160·1	284·03	F. Porter, Maleny
Rosevale Sunbeam	Junior (2 years)	5,090·0	278·942	H. F. Rowe, Kenilworth
Wattle of Roschill	Junior (2 years)	5,517·5	268·362	J. W. Evans, Boonah
Bangle of Roschill	Junior (2 years)	4,531·04	265·699	J. W. Evans, Boonah
Carnation Trixie	Junior (2 years)	4,347·75	253·136	C. Richards, Maleny
Silver Locket of Burnleigh	Junior (2 years)	4,123·35	248·233	W. Mallett, Nambour
Linda of Calton	Junior (2 years)	4,565·8	238·696	F. J. Cox, Imbil
FRIESIAN.				
Oaklands Holly Rock III.	Junior (2 years)	7,625·86	292·106	W. Richters, Tingoora

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

THE DIET OF THE NURSING MOTHER.

WE are suffering hard times and much unemployment. How hard the struggle is for many mothers is known only too well by the nurses in our Baby Clinics. In spite of all this the infant mortality (under one year) in Queensland during the year 1931 was much lower than it has been in any previous year. It nearly approaches the infant mortality of New Zealand, which is the lowest in the world. Not Queensland alone, but every Australian State and New Zealand, showed a record for low infantile mortality during 1931. It would seem that hard times, unemployment, and poverty lowered that mortality in all of them. How can we explain these amazing facts?

Very simply. Want of money has prevented many mothers from feeding their babies with artificial foods and compelled them to give their babies their natural food, and has so saved many lives. Though we recognise this, we must recognise also the credit that is due to the people of Australia for providing these mothers with sufficient sustenance. Still more credit must we give to the mothers, who have accomplished such great results in spite of much difficulty under most depressing conditions. Such mothers deserve all the help we can give them, and this is why we are writing about the diet of the nursing mother.

Unless the mother has been actually suffering from partial starvation, increase in the quantity of food taken does not as a rule increase the quantity of her milk. A deficient supply of breast milk is most commonly caused by the failure, for one reason or another, of the infant to empty the breasts at regular interval by sucking. This is fully explained in the Queensland Mothers Book. Other causes are that the mother is doing too much hard work, or has too many worries, or is in poor health. Under these circumstances the mother frequently tries to increase her breast milk by taking more food, and fails. But though the diet may have little influence on the quantity of breast milk, it has much influence on its quality. The mother may be taking a sufficient quantity of food, but unless the right foods are taken her milk may be deficient in the vitamins and other substances, which are necessary for the development of a strong, healthy baby. It is not always so, for nature, always careful of her young, may maintain a good proportion of these substances in the milk by draining the mother's body of its reserves. This is why we sometimes see a perfectly healthy baby being suckled by a sickly mother, to the further deterioration of her health. If this is continued, the mother will ultimately break down, and then the baby will suffer also. Let us consider then the food requirements of the nursing mother.

Mistaken Tradition.

Popular tradition has erred badly. Mothers have been taught to avoid green vegetables, because they are supposed to give the baby wind. Orange juice taken by the mother is said to curdle the milk. If she eats cheese, that is also supposed to upset the baby, and so on. All these are vain superstitions. What is good for the mother is good also for the baby. The first need of the mother is sufficient water. It is a good thing to drink a glassful before each suckling. She does not need a very large quantity of food, she should not force down food against inclination, but she should take the right kinds of food. Three meals a day will suffice. The most important food for her is good fresh cow's milk. This is not only the best, it is also the cheapest food. The simplest way to take it is to drink it.

Should the taste be disliked, flavour it with cocoa. Milk may also be taken as junket or in other ways, and the right quantity is at least a pint a day. If the mother believes that she cannot take milk, she should consult a doctor, for her condition is serious. After milk, butter and eggs are valuable, and if the mother can take cheese, so much the better. A moderate allowance of meat may be taken once or twice daily. Plenty of vegetables, especially green vegetables, are important aids. There remains only the question of bread. Wholemeal bread is recommended, but is hard to get, and what is sold as wholemeal is not always that. Therefore every nursing mother should take a heaped dessertspoonful of wheat embryo (Bemax or Vita B) or a heaped tablespoonful of bran (All Bran or Saubran) or both, twice a day. If she does not do this, the mother who eats largely of white bread is likely to have a white-faced constipated baby. Some of her bread may be substituted by potato, which is a better food. Indeed it is possible to live healthy on a diet of potatoes and milk alone; but we do not ask our readers to do this.

ONION BED.

It may be looking well ahead, but the onion bed for the next season should be prepared now. Onions require a deep soil—one where the roots can go well down; at the same time it should be firm. The consequence is that if trenching or deep digging is done, it should be done so that the ground can settle and get consolidated before the crop is planted or sown in spring. A good soil is required, but a soil heavily manured with stable manure will produce a large, bulky, but soft bulb that does not keep well. Potash is one ingredient that is absolutely necessary, and for this reason all ashes from wood and rubbish heaps should be scattered on the ground where the onion bed is to be. This can be done during the winter, as the soil holds the potash and does not leach out, as is the case with nitrogen.

PLATE 127.—A PROUD EXHIBITOR.

Miss Scrymgeour, of Netherby, Warwick, and the champion Shorthorn cow at the Brisbane Show—"Netherby Snow Queen."

Orchard Notes for October.

THE COASTAL DISTRICTS.

OCTOBER is frequently a dry month over the greater part of Queensland, consequently the advice that has been given in the notes for August and September regarding the necessity of thorough cultivation to retain moisture is again emphasised. Unless there is an adequate supply of moisture in the soil to meet the trees' requirements, the coming season's crop will be jeopardised, as the young fruit will fail to set.

Thorough cultivation of all orchards, vineyards, and plantations is therefore imperative if the weather is dry, as the soil must be kept in a state of perfect tilth, and no weeds of any kind must be allowed to grow, as they only act as pumps to draw out the moisture from the soil that is required by the trees or fruit-yielding plants. Should the trees show the slightest sign of the want of moisture, they should be given a thorough irrigation if there is any available means of doing so, as it is unwise to allow any fruit trees to suffer for want of water if there is a possibility of their being supplied. Intermittent growth, resulting from the tree or plant being well supplied with moisture at one time and starved at another, results in serious damage, as the vitality is lessened and the tree or plant is not so well able to ward off disease. A strong, healthy, vigorous tree is frequently able to resist disease, whereas when it has become debilitated through neglect, lack of moisture or plant food, it becomes an easy prey to many pests. If an irrigation is given, see that it is a good one and that the ground is soaked; a mere surface watering is often more or less injurious, as it is apt to encourage a false growth which will not last, and also to bring the feeding roots to the surface, where they are not required, as they only die out with a dry spell and are in the way of cultivation. Irrigation should always be followed by cultivation, so as to prevent surface evaporation and thus retain the moisture in the soil.

All newly planted trees should be carefully attended to, and if they show the slightest sign of scale insects or other pests they should receive attention at once. All growth not necessary to form the future tree should be removed, such as any growths on the main stem or main branches that are not required, as if this is done now it will not only save work later on, but will tend to throw the whole strength of the tree into the production of those limbs that will form the permanent framework of the tree. In older trees all water sprouts or other similar unnecessary growths should be removed.

Keep a good lookout for scales hatching out, and treat them before they have become firmly established and are coated with their protective covering, as they are very easily killed in their early stages, and consequently much weaker sprays can be used. The best remedies to use for young scales hatching out are those that kill the insects by coming in contact with them, such as miscible oils, which can be applied at a strength of 1 part of oil in 40 parts of spraying material, and will do more good than a winter spray of double the strength. In the use of miscible oils or kerosene emulsion, always follow the directions given for the use of those spraying materials, and never apply them to evergreen trees when they are showing signs of distress resulting from a lack of moisture in the soil, as they are then likely to injure the tree, whereas if the tree is in vigorous growth they will do no harm whatever.

All leaf-eating insects should be kept in check by the use of an arsenate of lead spray, taking care to apply it as soon as the damage appears, and not to wait till the crop is ruined. Crops, such as all kinds of cucurbitaceous plants, tomatoes, and potatoes are often seriously injured by these insects, and the loss occasioned thereby can be prevented by spraying in time. In the case of tomatoes and potatoes, a combined spray of Bordeaux or Burgundy mixture and arsenate of lead should be used, as it will serve the dual purpose of destroying leaf-eating insects and of protecting the plants from the attack of Irish blight.

Grape vines require careful attention, and, if not already sprayed with Bordeaux mixture, no time should be lost in applying this material, as the only reliable method of checking such disease as anthracnose or black spot and downy mildew is to protect the wood and foliage from the attack of these diseases by providing a spray covering that will destroy any spores that may come in contact with them. The planting of bananas and pineapples can be continued during this month. See that the land is properly prepared and that good, healthy suckers only are used. Keep the plantations well worked, and allow no weed growth. Keep a very careful lookout for fruit flies; destroy every mature insect you can, and gather and destroy

every fallen fruit. If this is done systematically by all growers early in the season the subsequent crop of flies will be very materially decreased. See that all fruit sent to market during the month is carefully handled, properly graded, and well packed—not topped, but that the sample right through the case or lot is the same as that of the exposed surface.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

MUCH of the matter contained under the heading of "The Coastal Districts" applies equally to these parts of the State; for on the spring treatment that the orchard and vineyard receives the succeeding crop of fruit is very largely dependent. All orchards and vineyards must be kept in a state of perfect tilth, and no weed growth of any kind should be allowed. In the Western districts, irrigation should be given whenever necessary, but growers should not depend on irrigation alone, but should combine it with the thorough cultivation of the land so as to form and keep a fine soil mulch that will prevent surface evaporation.

All newly planted trees should be carefully looked after, and only permitted to grow the branches required to form the future tree. All others should be removed as soon as they make their appearance. If there is any sign of woolly aphis, peach aphis, or scale insects, or of any fungus diseases on the young trees, these diseases should be dealt with at once by the use of such remedies as black leaf forty, Bordeaux mixture, or a weak oil emulsion. In older trees, similar pests should be systematically fought, as if kept in check at the beginning of the season the crop of fruit will not suffer to any appreciable extent. Where brown rot has been present in previous years, two or more sprayings with Bordeaux mixture can be tried, as they will tend to check other fungus growths, but at the same time the sodium or potassium sulphide sprays are more effectual for this particular disease and should be used in preference when the fruit is nearly full grown. All pear, apple, and quince trees should be sprayed with arsenate of lead—first when the blossom is falling, and at intervals of about three weeks. Spraying for codlin moth is compulsory in the fruit district of Stanthorpe, and wherever pomaceous fruit is grown it must be attended to if this insect is to be kept in check.

In the warmer parts a careful check should be kept for any appearance of the fruit fly, and, should it be found, every effort should be made to trap the mature insect and to gather and destroy any affected fruit. If this is done, there is a good chance of saving the earlier ripening summer fruit, if not the bulk of the crop. Tomato and potato crops will require spraying with Bordeaux mixture, as also will grape vines. Keep a very strict watch on all grape vines, and, if they have not already been treated, don't delay a day in spraying if any sign of an oil spot, the first indication of downy mildew, appears on the top surface of the leaf. Spraying with Bordeaux mixture at once, and following the first spraying up with subsequent sprayings, if necessary, will save the crop, but if this is not done and the season is favourable for the development of the particular fungus causing this disease, growers can rest assured that their grape crop won't take long to harvest.

Where new vineyards have been planted, spraying is also very necessary, as if this is not done the young leaves and growth are apt to be so badly affected that the plant dies.

Farm Notes for October.

FIELD.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore, our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, cowpeas, sorghums, millet, panicums, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants from preparing the ground to harvesting the crop, to which our readers are referred.

CLIMATOLOGICAL TABLE—JULY, 1932.

SUPPLIED BY THE COMMONWEALTH OF AUSTRALIA METEOROLOGICAL BUREAU, BRISBANE.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature. Means.		Shade Temperature. Extremes.				Rainfall.	
		Max.	Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	30·04	78	63	81	6	50	13, 14	65	4
Herberton	..	67	44	75	24, 31	27	12	92	6
Rockhampton	30·11	74	48	80	22	36	10	25	5
Brisbane	30·10	69	48	75	24	42	15	27	5
Darling Downs.									
Dalby	30·12	65	37	72	4, 5, 24	28	14	97	3
Stanthorpe	..	58	31	65	5	22	16	100	4
Toowoomba	..	61	38	68	24, 30	29	10	114	3
Mid-interior.									
Georgetown	30·03	80	47	84	25, 26, 27	32	12	0	..
Longreach	30·11	73	41	79	4	33	11	0	..
Mitchell	30·15	65	34	73	4	28	14, 28	118	2
Western.									
Burketown	30·06	79	52	86	6	43	11	0	..
Boulia	30·11	72	44	83	3	38	25	0	..
Thargomindah	30·12	64	40	74	4	36	1, 16, 29	53	2

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING JULY, 1932, AND 1931 FOR COMPARISON.

Divisions and Stations.	Average Rainfall. July.	Average Rainfall. No. of Years' Records.	Total Rainfall. July, 1932.	Total Rainfall. July, 1931.
North Coast.	In.		In.	In.
Atherton	0·99	31	1·33	0·42
Cairns	1·58	50	1·42	1·27
Cardwell	1·35	60	0·71	0·55
Cooktown	0·98	53	0·65	0·43
Herberton	0·78	45	0·92	0·50
Ingham	1·49	40	1·00	1·11
Innisfail	4·63	51	4·07	1·90
Mossman Mill ..	1·26	19	..	1·01
Townsville	0·61	61	0	0·08
Central Coast.				
Ayr	0·68	45	0·08	0
Bowen	0·90	61	0·40	0·08
Charters Towers ..	0·62	50	0	0·01
Mackay	1·61	61	0·52	0·31
Proserpine	1·35	29	0·70	0·68
St. Lawrence ..	1·25	61	0·19	0·17
South Coast.				
Biggenden	1·31	33	0·30	0·37
Bundaberg	1·78	49	0·49	0·64
Brisbane	2·20	81	0·27	1·78
Caboolture	2·13	45	0·35	1·60
Childers	1·66	37	0·08	0·72
Crohamhurst ..	2·85	39	0·61	1·64
Esk	1·96	45	0·44	1·51
Gayndah	1·43	61	0·45	0·98
Gympie	2·10	62	0·43	0·78
Kilkivan	1·60	53	0·41	1·02
Maryborough ..	1·84	60	0·21	0·81
South Coast—continued				
Nambour	2·64	36	0·40	1·50
Nanango	1·65	50	0·75	0·65
Rockhampton ..	1·39	45	0·25	0·43
Woodford	2·34	45	0·36	1·86
Darling Downs.				
Dalby	1·72	62	0·97	0·96
Emu Vale	1·54	36	1·20	1·60
Jimbour	1·53	44	0·65	0·84
Miles	1·61	47	0·65	0·84
Stanthorpe	2·03	59	1·00	1·95
Toowoomba	2·03	60	1·14	2·42
Warwick	1·82	67	1·71	1·72
Maranoa.				
Roma	1·42	58	0·53	1·28
State Farms, &c.				
Bungeworgorai ..	1·31	18	0·39	1.24
Gatton College ..	1·34	33	0·64	2·21
Gindie	0·90	33	..	0·55
Hermitage	1·70	26	1·44	1·82
Kairi	1·14	18	..	0·55
Mackay Sugar Experiment Station ..	1.35	35	0·37	0·19

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	September, 1932.		October, 1932.		Sept., 1932.	Oct., 1932.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					MOONRISE.	
					a.m.	a.m.
1	6·10	5·34	5·36	5·48	6·12	5·52
2	6·9	5·34	5·35	5·48	6·46	6·27
3	6·8	5·35	5·34	5·49	7·21	7·11
4	6·7	5·35	5·33	5·50	7·56	7·59
5	6·6	5·36	5·32	5·50	8·33	8·55
6	6·5	5·36	5·31	5·51	9·16	9·57
7	6·4	5·37	5·29	5·51	10·5	11·2
						p.m.
8	6·3	5·37	5·28	5·52	11·3	12·6
					p.m.	
9	6·2	5·28	5·27	5·52	12·6	1·10
10	6·0	5·38	5·26	5·53	1·9	2·7
11	5·59	5·39	5·25	5·53	2·11	3·5
12	5·58	5·39	5·24	5·54	3·15	3·59
13	5·57	5·40	5·23	5·54	4·13	4·52
14	5·56	5·40	5·22	5·55	5·10	5·43
15	5·54	5·41	5·21	5·55	6·4	6·40
16	5·53	5·41	5·20	5·56	6·57	7·35
17	5·52	5·42	5·19	5·56	7·50	8·29
18	5·51	5·42	5·18	5·57	8·46	9·23
19	5·49	5·43	5·17	5·58	9·42	10·17
20	5·48	5·43	5·16	5·58	10·37	11·10
21	5·47	5·43	5·15	5·59	11·29	11·59
22	5·46	5·44	5·14	5·59	..	..
					a.m.	a.m.
23	5·45	5·44	5·13	6·0	12·24	12·46
24	5·44	5·44	5·12	6·1	1·17	1·27
25	5·43	5·45	5·12	6·1	2·8	2·4
26	5·42	5·45	5·11	6·2	2·52	2·37
27	5·40	5·46	5·10	6·3	3·32	3·10
28	5·39	5·46	5·9	6·3	4·8	3·44
29	5·38	5·47	5·8	6·4	4·42	4·20
30	5·37	5·47	5·7	6·5	5·17	4·59
31	..	..	5·6	6·6	..	5·47

Phases of the Moon, Occulations, &c.

4 Sept.	● New Moon	5	55 a.m.
7 ,,	☾ First Quarter	10	49 p.m.
15 ,,	○ Full Moon	7	6 a.m.
23 ,,	☽ Last Quarter	10	47 a.m.
30 ,,	● New Moan	3	30 p.m.

Perigee, 4th September, at 4·48 a.m.
Apogee, 20th September, at 1·54 a.m.

Venus will be at its greatest elongation, 46 degrees west of the Sun on the 8th, when it will rise at 3·25 a.m., being near the border-line of Gemini and Cancer.

Saturn will be 4 degrees north of the Moon as they approach the western horizon before half-past three in the morning of the 11th.

Mercury and Jupiter will appear to be very near to one another, amongst the stars of Leo, when seen in the early morning, especially about the 13th.

About half an hour before setting on the morning of the 15th September, the Moon will be dipping into the shadow of the Earth and showing signs of a coming eclipse, which will occur when it is below the horizon in Queensland. The darkened part of the Moon's face will be more extensive in the west than in Brisbane.

As Jupiter will apparently be passing very close to Neptune on the 18th, observers will find it interesting to look for these planets in the evening with their telescopes, before the Moon rises, about this time of the month. The planets will rise about one hour before the Sun.

On the 23rd the Sun will reach the junction between the ecliptic and the celestial equator, and the Australian vernal equinox will occur.

After the Moon has risen on the morning of the 25th the nearness of the planet Mars will be noticeable, a conjunction having occurred about an hour before rising, when they were about 2 degrees apart.

A conjunction between the Moon and Venus will occur a day later, 26th, at 4 a.m., when they will be 4 degrees apart.

Mercury rises at 5.13 a.m. on 1st September.

Venus rises at 3.27 a.m. on the 1st and at 3·26 a.m. on the 15th.

Mars rises at 3.19 a.m. on the 1st and at 3·0 a.m. on the 15th.

Jupiter rises only 9 minutes before the Sun on the 1st and 38 minutes before t on the 15th.

Saturn rises at 2·30 p.m. and sets at 4·6 a.m. on the 1st; on the 15th it will rise at 1·33 p.m. and set at 3·7 a.m.

The Southern Cross will be at its most western position III. at 8 o'clock on the 1st, and at VI. on the 30th to observers near the 150th meridian.

7 Oct.	☾ First Quarter	6	5 a.m.
14 ,,	○ Full Moon	11	18 p.m.
23 ,,	☽ Last Quarter	3	14 a.m.
30 ,,	● New Moon	12	56 a.m.

Perigee, 2nd October, at 3.18 a.m.
Apogee, 17th October, at 4.6 p.m.
Perigee, 31st October, at 12.18 p.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 23 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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